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ENERGY

No. 150

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CONTENTS

OIL AND GAS

DRILLING FOR GAS IN EASTERN TURKMEN

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 4, Apr 83 pp 18-20

[Article by G. I. Amurskiy, A. A. Abdeyev, N. N. Solov'yev, A. A. Timonin, and Z. B. Khusnutdinov of the All-Union Scientific Research Institute on Natural Gas of the Turkmen gas industry: "A Promising Direction for Drilling Operations in Eastern Turkmen" under the heading: Problems and Prospects.]

[Text] The established features of the localization of gas in the carbonaceous subsalt system of the Zaunguzskiy region indicates a wide stratigraphic range in its gas content and the need of a search for new deposits.

With the expansion of the geography of exploratory drilling, ideas about the location of gas traps in a regional carbonaceous reservoir have changed. For a long time the notion that massive or near-massive accumulations of gas are confined in the upper sections of a carbonaceous subsalt stratum determined the method of exploratory drilling. The many deposits in the Chardzhouskaya fault in Western Uzbekistan were opened according to this method. In the adjacent Zaunguzskiy region, however, the permeable IXth and Xth levels lying in the lower part of the carbonaceous stratum already have proved to be industrially gas-bearing (the formations of Kirpichli, Northern Balkui, Bagadzha, and others).

The primary orientation of the search for gas deposits in the roof of the carbonaceous stratum (during its unfinished development) made for an insufficient study of the basal strata of the cross section in a number of areas.

In its turn, the growing accentuation in the exploration of the Xth (Kirpichlinskiy) level in the western regions of the Amudarinskaya syneclise sharply reduced attention to the study of the productivity of the levels "pressed down" on the anhydrous salt mantle. Despite the fact that here, as distinct from the Chardzhouskiy region, the filtration properties of the rocks composing the upper sections of the carbonaceous cross section are substantially impaired, interlayings of rather capacious collectors are distributed, frequently sporadically, within their volume. Other conditions being favorable, such sites become industrially productive by virtue of the hydraulic communication of the differently aged levels of the carbonaceous system on a regional plane in conjunction with the intensive admission of gas into it from

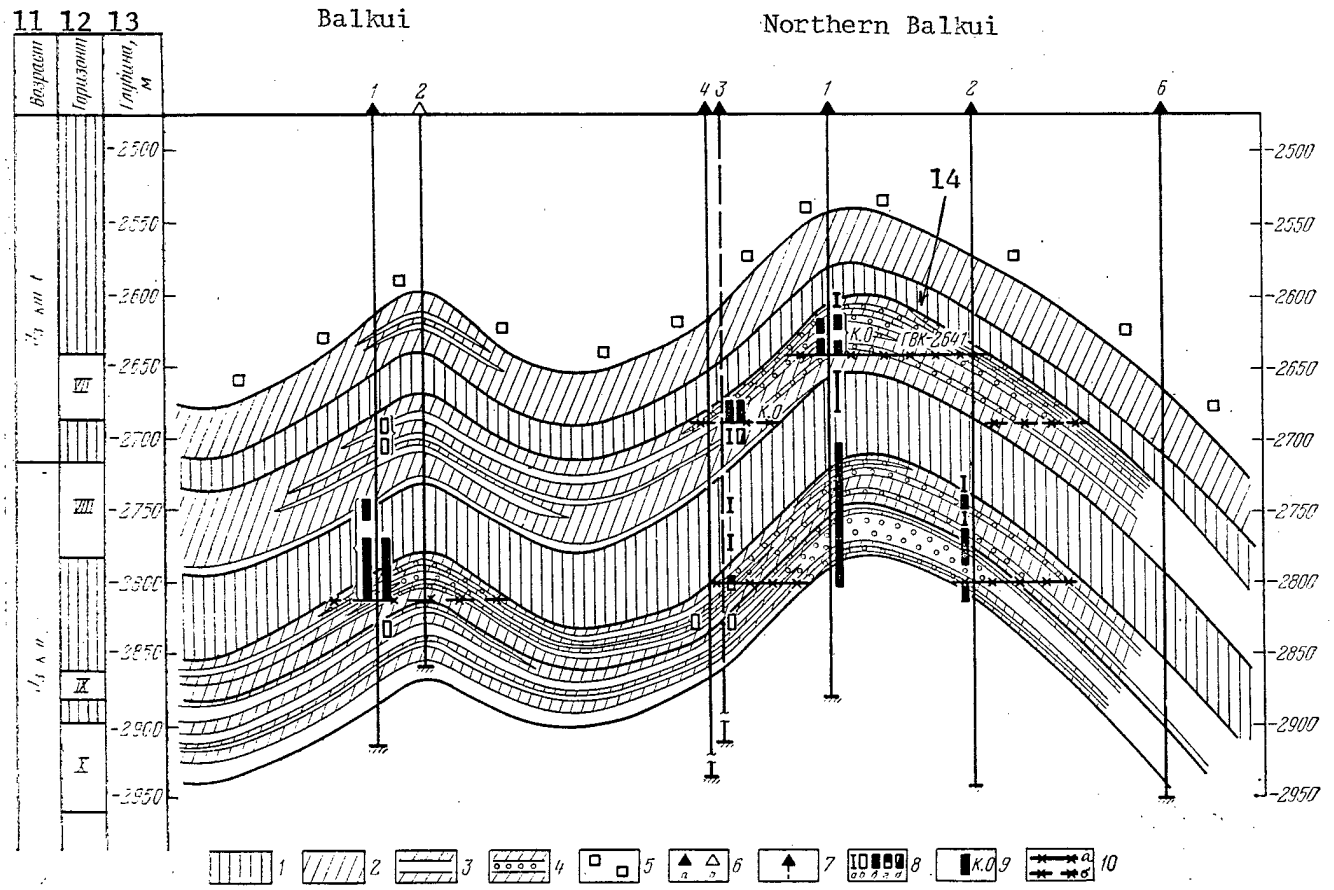

Figure 1. The Kirpichlinskiy swell. A geological cross section of the carbonaceous subsalt deposits.

1- mantle, 2- weakly permeable low-porosity rock (permeable noncollector), 3- collector, 4- gas-saturated collector, 5- regional anhydrous salt fluid-support of the gaurdakian suite, 6- exploratory wells (a- has been drilled), 7- a well carried down the profile, 8- results of sampling (a- dry, б- water, в- gas, г - gas manifestations), 9- hydrochloric acid treatment of an interval in the perforation, 10- gas-water contact (a- confirmed, b- anticipated), 11- age, 12- level, 13- depth m. 14- GVK [gas-water contact]

underlying lower-mid-Jurassic gas-generating deposits. In other words, the volume of gas formation in the subsalt floor of the Amudarinskiy basin can fill with gas all the traps formed in the body of the carbonaceous stratum of the salt area.

Entirely obvious, therefore, is the necessity to search for near-massive gas deposits in the zones of the impairment of the collecting properties of the sulfate and carbonaceous stratum where stratified gas deposits in the Xth, and less commonly in the IXth, levels are taken for the primary propagation. In addition, it is necessary to note the high dispersal of gas-productive spaces in the analogous VIIth and VIIIth levels of such zones. Also, the low magnitudes of the effective gas-saturated thicknesses require using high-resolution methods of discovery and the stimulation of prospective gas-bearing spaces in order to avoid obtaining erroneous information.

In this connection, it is necessary to carry out sampling most carefully of the usually small-capacity but sometimes numerous stratified collectors dispersed in thick weakly penetrable rocks including the so-called "permeable noncollectors" or "pseudo- cap rock" that compose the upper sections of the carbonaceous stratum in a number of internal regions of the Amudarinskaya synecline.

The territory of the Zaunguzskiy Kara Kums, including the Kirpichlinskaya, the Eastern Unguzskaya, and the Mergen-Bagadzhinskaya zones of gas accumulation, is characterized by the confinement of gas deposits primarily to the basal level of the carbonaceous subsalt system. If, within the limits of the Bagadzhinskiy swell, the productive deposits are in the IXth, Xth, and VIIIth levels (the formations of Bagadzha and Malay), then at the Eastern Unguzskiy and Kirpichlinskiy swells, the gas deposits are confined to the Xth level. Only at the Northern Balkuinskiy formation a single gas deposit appeared in the IXth and Xth levels because of the absence of a mantle of a mantle between them. At this same formation, inflows of gas were obtained from the VIIIth level. These data, especially if account is taken of the extremely weak study of the carbonaceous subsalt stratum at a number of other areas in the territory being considered, point to a potential in exploring the VIIIth (and in some cases the VIIth) level.

It is necessary to point out that the productiveness of searching the VIIIth level, because of the concentration of collector interlayers principally in the crest parts of the structure, depends to a significant degree on how much, under optimum conditions, this level will be opened up and sampled.

At the Kirpichlinskiy formation, deposits of the VIIIth level were sampled in two wells (No. 2 and 4) which were drilled far from the dome. Both installations proved to be "dry" which is explained by the low collector properties of deposits at the peripheral sites of the local uplift and by the small total thickness of the collectors. At well No. 1 , however, the thickness increases to 15 m and the exposed porosity reaches 22.5 percent. On the structural map, the zone of maximum concentration of high porosity interlayers within the volume of the VIIIth level is outlined by the minus 2600-meter isohypse which also may be taken as the minimum possible datum for GVK [gas-

water contact]. The high isolating properties of the carbonaceous evaporative mantle of the VIIIth level (thickness 24-28 m, the seam of rock salt 6-10 m) contribute to the preservation of the deposit. The dimensions of the probable deposit in the VIIIth level of the Kirpichli formation are 10.5 X 5 km and 50 m height.

At the Northern Balkui formation where the industrially gas-bearing hydraulic wells of the IXth and Xth levels are, inflows of gas were obtained also in sampling the VIIIth level (Figure 1). In the crest well No. 1, with the combined opening up of the intervals from 2801-2807 and 2820-2826 m, the yield of gas amounted to 83,600 m^3/24 hrs. After carrying out hydrochloric acid processing, it increased to 171,000 m^3/24 hrs. The datum for gas-water contact was taken at the lower hole of the perforated space - minus 2641 m (depth 2826 m). During sampling at well No. 3 opening up this level at the western periphery of the structure - that is, at 52 m below the adopted datum - an inflow of gas was obtained with a yield of 6,200 m^3/24 hrs (on a 5-mm flow regulator) without signs of water deposits.

These data show, on the one hand, the substantial reduction of the collector properties of the rock in this part of the trap, and on the other, that it was opened up outside of the flooded part. Therefore, gas-water contact can be lowered to the minus 2690 m datum. In this case, the dimensions of the gas deposit in the VIIIth level are increased to 13 X10 km with a 90 m height which can provide a three-fold increase in the gas supply.

To refine the position of gas-water contact, it is necessary to drill an exploratory well on the more gently sloping north-east side of the structure where, as at the dome, the VIIIth level is characterized by higher values of the effective gas-saturated thicknesses.

In the Balkuinskaya area in a single exploratory well during the sampling of the IXth and Xth levels, a weak inflow of gas with a yield of 13,500 m^3/24 hr was obtained, and, from the overlying VIIIth level, an inflow of water. It was considered that the well had opened up the productive level of the dome of the structure. Therefore, because of the low collector properties of the gas-saturated rock of the IXth and Xth levels, the conclusion was reached that the revealed accumulation was not of industrial value.

Seismographic survey operations done later by the method of OGT [common depth point (method)] that the well had been drilled at a distance of 2.7 km to the west of the dome of the Balkuinskiy structure and that the roof of the IXth level had been opened up 20-25 m below its position in the dome. These data show that the volume of the trap in the IXth level, which is situated hypsometrically above the level of the well that was opened, can contain 2-3 billion m^3 of gas. In addition, the high gas-saturation of the stratified water obtained in tests of the VIIIth level and the good collector properties of the rocks composing it, allow the possibility of a small deposit of gas in it.

It is advisable to put a No. 2 exploratory well 2.7 km to the east of well No.1 in the dome of the structure, based on the map produced with data obtained by MOGT [common depth point method]. The well can be used as a production well

for the deposit of the IXth level. Taking into account the small height of the fold and the communicativeness of the IXth and Xth levels, the deposit of gas in the IXth level most likely should be attributed to a type of floating dome.

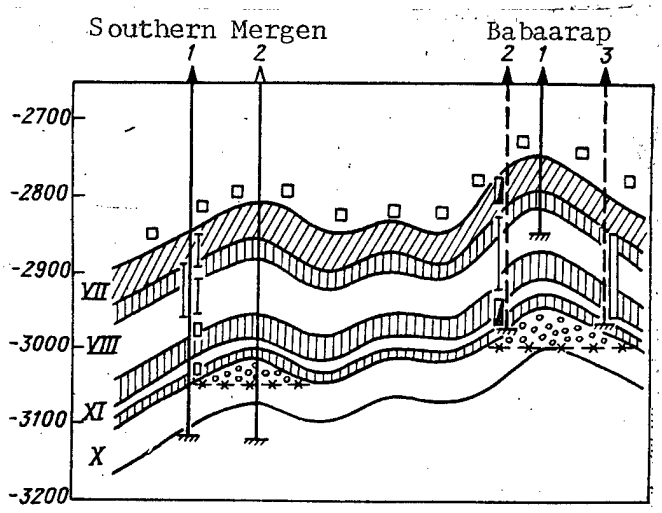

Figure 2. The Mergenskiy swell. A geological cross section of the carbonaceous subsalt deposits.

(The legend is the same as for Figure 1)

Within the limits of the Mergen-Bagadzhinskiy zone, are gas accumulations of industrially gas-bearing basal levels of a carbonaceous system which, in the area of Southern Mergen and Babaarap turned out to be unexplored. Here, as in the Gagarinskaya area, the drilling carried out earlier was oriented to the search for massive gas deposits in the upper sections of the subsalt carbonaceous stratum directly the anhydrous salt mantle. The characteristics established by now in the Zaunguzskiy Kara Kums served as a basis for the reintroduction of exploratory drilling into this area.

At the Babaarapskiy structure, in the first stage, three wells were drilled not one of which uncovered an analog of the Xth level (Figure 2). Gas manifestations were noted in sampling the IXth level. At the Southern Mergenskiy area, although the Xth level was opened up by a single exploratory well, it was not tested, and the IXth and lower parts of the VIIIth levels turned out to be water saturated (Figure 2). Possibly the water content of the cross section is explained by an unfavorable location of the single exploratory well (which was drilled 7 km to the south-east of the dome and almost 40 m below the highest elevation of the roof of the subsalt formations.

In addition to exploration of the Xth level, a supplementary study will be carried out in these same areas in the more favorable structural conditions of the deposits in the VIIIth and IXth levels. In the No. 2 well in the Babaarap area they have been distinguished by increased indications according to the mud logging, and in the Southern Mergen area, highly gas-saturated stratified water has been noted.

The analysis of the results of the geological explorations permits the estimate of a possibility of obtaining here a supplementary increase in the supplies of gas among deposits and areas which had been withdrawn from exploratory drilling.

9136
CSO:1822/219

FUEL, POWER CONSUMPTION IN EUROPEAN REGION

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 4, Apr 83 pp 44-45

[Article by S. I. Maysuradze of VNIIEgazprom [All-Union Scientific Research Institute for Economics, Organization of Production, and Technical and Economic Investigations in the Gas Industry]: "Features of the Development of the Structure of the Consumption of Fuel and Power in the Countries of the European Region" under the heading: "The Gas Industry Abroad." This article begins in issue No 3, 1983]

[Text] Analysis of the features of the development of the structure of fuel and power consumption of the countries in socialist collaboration permits concluding that questions of the efficient development of fuel and power consumption and the formulation of its optimum structure can be solved successfully only on the basis of multilateral cooperation.

Development of Power Consumption in member-countries of SEV [Council of Mutual Economic Assistance].

As distinct from basic trends in the development of power consumption in Western Europe, the fuel and power consumption of countries that are members of the SEV in the period 1960-1980 was characterized by stability and a rather high rate of growth (about 3.2-3.3 percent per year), and also by an absence of fuel and power crises.

Power consumption in this period grew most rapidly in those countries (NRB [People's Republic of Bulgaria], VNR [Hungarian People's Republic], and SRR [Socialist Republic of Romania]) where the level of development of the national economy in particular branches of heavy industry at the beginning of the 1960s was relatively low. By now, a significant structural transformation has been brought about in the national economy in these countries. A number of production facilities satisfying the most modern demands in scientific and technical development were created. For instance, in the NRB, the production of high quality electrical equipment, electric motors, and computer equipment has been mastered, in the SRR, the production of reliable drilling equipment was organized, and in the VNR, good results have been achieved in the development of a motor vehicle industry, of electronics and others.

In the 1970s the rate of growth of power consumption in all SEV countries was somewhat reduced which was closely connected with the optimization of its structure - such progressive energy-bearing substances as petroleum and natural gas began to occupy an ever larger proportion of the structure of fuel consumption.

Despite the world crisis in fuel and power that began in 1973, the SEV countries proved to be the solitary region avoiding its grave consequences. The long-term planning of the use of natural resources before everything else justified itself. The problem of steadily supplying SEV countries with coal, petroleum, natural gas, and electrical power was solved successfully on the basis of an expansion of cooperation in the fraternity of countries within the frameworks of the separate bilateral and multilateral agreements of the comprehensive program of socialist economic integration. The fundamental direction of the development of cooperation from 1960-1980 was the intensification of reciprocal deliveries of various kinds of fuel and electrical power, and also the joint construction of the productive capacities necessary to provide these deliveries.

Coal was the largest part of the structure of fuel and power consumption in the SEV countries in the period 1960-1980 (see Table). This was conditioned by the presence in the region of large supplies of that energy-bearing substance and the wide distribution of various methods for its use in a number of branches of the national economy.

The structure of fuel and power consumption in SEV countries
(in percent)

Energy resources	Years				
	1960	1965	1970	1975	1980
Coal(bituminous and brown)	82.9/56.3	79.3/48.3	62.4/35.5	60.3/31.1	57/27.3
Petroleum	10.3/27	12.2/30.3	23.6/33.3	24.2/35.1	25/35.7
Gas	6/15.2	7.3/17.8	12.4/20.6	12.8/23.8	15/16.8
Hydraulic and nuclear power	0.8/1.5	1.2/3.6	1.6/3.6	2.7/4	3/4.4

Note: The numerators are data for European countries, the denominators are data for the USSR. Compiled according to material in the report: "Energy problems and cooperation in the region of the EEK [European Economic Council]" published by the secretary of the EEK at the UN, 1981.

The proportion of petroleum in the power consumption structure of the SEV countries in this period, though it grew steadily, it remained approximately half as big as the proportion of coal and in 1980 it amounted to 25 percent of the total. The basic reason for this is the absence in the territory of the series of countries of socialist collaboration in large-scale reserves of petroleum.

The use of hydraulic and nuclear power in SEV countries in the 1960-1980 period was continually increased but, despite this, the proportion of these kinds of power in the fuel and power balance remains lower than in Western

Europe. Therefore, for SEV countries the solution of the problem of accelerating the development of advanced methods of transforming nuclear energy into power, and the construction of nuclear power plants and sharply increasing the production of electrical power from them, acquires a special importance.

A significant growth in the proportion of natural gas was observed in the structure of fuel and power consumption in SEV countries in the the 1960-1980 period. At the beginning of the 1960s gas consumption by the countries in socialist collaboration was so small that it amounted to no more than two to three percent of the structure of power consumption. The drawing into economic circulation of their own reserves of natural gas, the expanding sphere of its use, and the development of cooperation in the gas industry are the basic factors in the notable strengthening of the role of natural gas in power engineering in the SEV countries and the growth of its proportion in the structure of fuel and power consumption. In the period being considered, the proportion of gas in the power consumption structure was reduced only in the SRR, which is a consequence of measures carried out to conserve the supply of it and to make wider use of other energy sources, mainly coal. Nevertheless, the proportion of gas in the power consumption structure of the SRR in 1980 was substantially greater than in other SEV countries. Here, gas plays the main role in providing the national economy with fuel and power.

The prospect for development of the fuel and power economy is the subject of careful study for a large number of specialists of the countries in socialist collaboration. At the end of 1970 long-range energy programs and plans for action on the rational use of fuel and power were developed by them and adopted for use by the government.

Analysis of these programs and plans shows that despite the differences in each country, they have much in common. In particular, for all the SEV countries the following important directions for the development of fuel and power are typical:

- an increase in the consumption of fuel and power at the expense of natural resources,
- a reduction in the annual rates of growth in the consumption of fuel and power,
- the development of more modern and efficient methods of producing and consuming fuel and power,
- reduction of fuel and power consumption per unit of produced national income.

It is necessary to point out that for the SEV countries the preservation of the present high rates of growth in power consumption does not appear possible in the future. Because of this, an acute need is arising in the essential structural transformations of the economics of these countries in the development of power consuming industries which possess large-scale reserves of fuel and power.

Satisfaction of the economically sound requirements for fuel and power in the countries in socialist collaboration in the future will be accomplished through the realization of the broad scope of the actions specified in the long-range special purpose program for cooperation (DTsPS) in the field of fuel and raw materials for the period up to 1990, which was approved at the 37th session of the SEV in 1978. In the program, a collectively developed strategy was set forth for solving the problem of providing energy, the basis of which consists not in an acceleration of the mining of energy-bearing substances or a build-up in the volume of reciprocal deliveries of them, but in the development of the economical and rational use of them in every possible way.

The DTsPS specifies:

- further evolution of cooperation in the development of electrical power especially nuclear, and in the solution of the problems of providing for the electrical power requirements of SEV countries,
- development of cooperation in the extraction and use of solid fuel resources,
- expanding cooperation in the field of the economical use of fuel and power,
- deepening cooperation in providing for the requirements of SEV countries for petroleum, petroleum products, and gas,
- expanding cooperation in the rational development and distribution of energy-consuming industries.

In future development the structure of fuel and power consumption in the countries in socialist collaboration (except for the USSR), as distinct from the development of that structure in Western Europe, will have a number of features. These will be primarily the following:

- shrinkage in the proportions of coal and petroleum,
- a high rate of growth in the consumption of hydraulic and nuclear power,
- some reduction and then a stabilization of the proportion of natural gas in fuel consumption.

The most important feature of the development of the structure of fuel and power consumption in the USSR in 1990 is the proportion of natural gas which substantially exceeds the corresponding proportion for Western Europe and the Eastern SEV countries. In addition, according to the forecasts, gas will play the principal role in the power consumption structure of the USSR in 1990.

According to the DTsPS, for the countries in socialist collaboration the broad inclusion of solid fuel (bituminous and brown coal, lignite) is projected in the economic turnover based on the introduction into use of progressive methods and modern technical means for the construction and operation of collieries and strip mines. The DTsPS stipulates a build-up of cooperation in the improvement and widespread application of efficient methods for transforming coal into other kinds of fuel (liquid or gaseous) which, in perspective, are acquiring special urgency. Thus, from 1980 to 1990 coal will dominate the structure of fuel and power consumption in the SEV countries (except the USSR).

The extraction of coal, the development of the supplies of which also is being planned, in the majority of cases will be accompanied by a deterioration of mining-and-geological and natural-and-climatic conditions. In addition, the average calorific value of future mined coal will be reduced and the zonality of it will be increased. Therefore, the increase of the volume of coal extraction which is envisaged in all SEV countries (except the VNR and USSR) cannot change the structure of power consumption in favor of coal in the countries in socialist collaboration. Its proportion in the future will be decreased. The consumption of coal to propduce electrical power also will be reduced.

In the future, nuclear energy will be the principal substitute for coal. Much attention was given to acceleration of the development of nuclear power in the DTsPS. The most urgent and difficult problems in the development of nuclear power which require the combined efforts of the fraternity of countries were defined in the program. The development of cooperation in the SEV countries in nuclear power engineering within the framework of the DTsPS will create conditions for the construction of nuclear electric power stations in collaborating countries with the technical assistance of the USSR.

The countries in the socialist collaboration, according to the DTsPS, plan a more intensive development of hydraulic power engineering. Realization of the specified measures of the program will foster a significant increase in the proportion of hydraulic and nuclear power in the power consumption structure in SEV countries in th 1980-1990 period and in the more remote future.

The planned reduction of the proportion of petroleum in the power consumption structure of the countries in socialist collaboration is dictated by a number of circumstances. Already at the present time,for lack of large natural reserves of petroleum, SEV countries have their demands for it satisfied mainly by deliveries from the USSR. In the period being considered, the maximum inclusion of all existing petroleum resources in the SEV countries is planned. Undoubtedly this will yield the specified positive results, but it will not fully provide for petroleum requirements. In addition,the SEV countries plan in the future to expand substantially the use of petroleum, not as a fuel, but as a raw material in the chemical industry. The replacement of petroleum in power consumption will be accomplished by an increase in the consumption of nuclear power and natural gas.

9136
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CALL FOR MORE EFFICIENT USE OF DRILL BITS

Moscow NEFTYANIK in Russian No 11, 1982 pp 12-13

[Article by M. Abramson VNIIBT [All-Union Scientific Research Institute of Drilling Equipment]: "Comprehensive Utilization of Reserves for Raising the Efficiency of Drill Bits"]

[Text] The most perfect and most durable rock-drilling tool takes precedence in solving the problem of raising the efficiency of drilling. Designs and organized series production of new highly efficient drill bits were recently developed in our country. For a number of years NEFTYANIK pages contained articles on the design series of new bits, the optimal modes of their finishing, methods for selecting the most efficient types of bits etc. This article synthesizes various ways for raising the efficiency of utilization of drill bits into one complex.

In recent years, 1976-1981, in most production associations of the Minnefteprom [Ministry of Petroleum and Gas Industry], tunneling and sinking were done with drill bits. The greatest increase in the use of drill bits in tunneling and sinking was in operational drilling in the following associations:

"Komineft'" -- by 2.44 times;
"Kuybyshevneft'" -- by 2.25 times;
"Tadzhikneft'" -- by 91%;
"Saratovneftegas" -- by 64%;
"Grozneft'" -- by 60%;
"Bashneft'" -- by 50.5%;
"Perm'neft'" -- by 47%;
"Orenburgneft'" -- by 44%;

"Uzbekneft'" -- by 44%;
"Udmurtneft'" -- by 41%
"Krasnodarneftegaz" -- by 40%;
"Tatneft'" -- by 32%.

In prospecting drilling the greatest increase in sinking with drill bits was reached in the following associations:

"Kuybyshevneft'" -- by 2.21 times;
"Saratovneftegaz" -- by 87.4%;
"Tadzhikneft'" -- by 72%;
"Komineft'" -- by 60%;
"Orenburgneft'" -- by 46%;
"Bashneft'" -- by 42.8%;
"Belorusneft'" -- 42%;
"Udmurtneft'" -- by 40%;
"Nizhnevolzhskneft'" -- by 30%

There is no doubt that, along with other factors, a considerable change in the pool of the drill bits used in the Urals-Volga regions and the European North has a positive effect on increasing sinking with drill bits: an increase in the share of the GNU series of bits with sealed oil-filled bearings with low rotation speed drives; the wide use of the GN series of bits with hard alloy teeth for rotary drilling and a considerable improvement in sets of bit types used and their operation.

Of concern is the fact of the systematic reduction in the mechanical speed of sinking in the "Tatneft'," "Bashneft'," "Kuybyshevneft'" and "Orenburgneft'" associations, as well as in operational and exploration drilling; "Saratovneft'" and "Mangyshlakneft' -- in operational and "Permneft'" in exploration drilling. To a certain extent, this "dilutes" successes achieved in increasing the sinking in a run. At the same time, the "Udmurtneft'" increased the mechanical sinking speed in these two types of drilling; an increase in this indicator is noted in operational drilling by the "Permneft'" and "Komineft'" associations, and in exploration drilling by the "Saratovneftegaz" and "Mangyshlakneft'" associations.

Yet, in spite of certain progress, the achieved level and growth rate of sinking with the drill bit do not fulfill the drilling indicators planned for the end of the 11th Five-Year Plan period. There are still considerable unrealized reserves for raising the bit work indicators further.

One of the essential reserves is rigid quality control of the bits received which must prevent the use of defective drill bits in wells and thereby reduce drilling indicators. Here the "Tatneft'" and "Bashneft'" associations are in the best position because they have special bases for quality control on incoming drill bits.

"Stavropol'neft'," "Belorusneft'," "Ukrneft'," "Permneft'," "Kuybyshevneft'" and several other associations have positive experience in such work. It is only beginning in a number of associations.

It should be remembered that if a drill bit has a diameter smaller than the nominal one, this leads to the narrowing of the well shaft and the creation of a real danger of wedging the following drill bit in the shaft, or the necessity of reworking at additional costs.

The danger of the drill bit being wedged in the shaft also arises when the diameter of the drill bit is larger than the nominal one plus a maximum deviation.

Differences in drill bit elevation in relation to buttress threads of the seat leads to premature failure of the drill bit and to a sharp reduction in the life of its bearings.

Deviations from the allowable values of the radial play of the rasps may lead to premature wear of the gaging crowns of the rasps and the edges of the legs, and a reduction in the work indicators of the drill bits, as well as a spontaneous change in the trajectory of the well shaft.

Deterioration in the hydraulic tightness of seams and washing devices, as well as deviations in making good threaded connections facilitate the origination of emergency situations in the well.

A lack of lubricating materials in the bearings and compensation devices of the GNU and GAU series of drills with sealed oil-filled bearings, defects in the sealing unit of the bearings and compensation devices lead to a considerable reduction in the efficiency of these drill bits.

The control procedure for incoming drill bits is regulated by RD 39-2-88-78 "method for monitoring three-bit drills with diameters from 165.1 to 320 mm" developed by the VNIIBT and approved in the established order (Moscow, VNIIBT, 1979).

Another essential reserve in raising the efficiency of drill bits, as shown by the VNIIBT, its Perm' affiliate and experimental research departments, as well as of several territorial NIPI [Scientific Research and Planning Institute], is the selection and use of efficient types of drill bits according to the properties of the rock to be drilled which makes it possible to increase drill bit efficiency by 20 to 30%, and reduce their consumption per well in the rotary method of drilling as well as when being used with other engines (turbodrills, electric drills, helical drives, turbo- and electrical drills with reducer inserts etc.).

For example, in 1980-1981, at the Kislovskaya and Yaz'vinskaya areas (the Krasnovisherskaya UBR of the "Permneft'" Association), in 19 wells drilled where efficient types of drills and methods were used, the following increases were obtained for a drilling volume of over 42,500 meters:
drill bit sinking -- by 25%
mechanical sinking speed -- by 7%;
commercial speed -- by 38%.

Here, drill bit consumption was reduced by 23%, and 6.92 rubles per meter of sinking were saved in operational costs.

In 1980-1981, the "Udmart" Association drilled 109 wells with a total depth of over 136,000 meters in the Yel'nikovskaya, Mishkinskaya and Kranogorskaya areas according to the recommendations for the use of efficient types of drill bits. Here an increase was obtained as follows:

sinking with drill bit -- by 18 to 26%;
mechanical speed of sinking -- by 16 to 32%;
commercial speed -- by 15 to 17%.

Savings in the operational costs per meter of sinking was 1.57 to 2.68 rubles. Drill consumption was reduced by 19 to 21%.

Similar results were obtained when sinking with efficient drill types in a number of wells at the "Kuybyshevneft'," "Tatneft'," "Bashneft'," "Ukrneft'," "Azneft'," etc.

It should be stressed that such results are achieved without additional costs due only to the correct application of the drill bit sets and their efficient finishing off.

The method of this work developed in the VNIIBT is described in the following guides: RD 39-2-52-78 "Comprehensive method for classifying rock of a geological cross section, dividing it into typical rock packets and selecting efficient types and designs of drill bits for efficient drilling of petroleum and gas wells." (Moscow, VNIIBT, 1980); RD 39-2-51-78 "Instruction for operating drill bits when drilling petroleum and gas wells: (Moscow, VNIIBT, 1978); addendum No 1 to RD 39-2-51-78 "Basic rules for operating drill bits with sealed oil-filled bearings when drilling petroleum and gas wells" (Moscow, VNIIBT, 1980); addendum No 2 to RD 39-2-51-78 "Express method for adopting decisions for improving the operation of drill bits when drilling petroleum and gas wells" (Moscow, VNIIBT, 1981).

To improve indicators of drilling with core recovery, the VNIIBT developed the RD 39-2-399-80 "Methodological guide for drilling petroleum and gas wells with core recovery" (Moscow, VNIIBT, 1982) and for diamond drilling tools -- RD 39-2-77-78 "Instruction for drilling petroleum and gas wells with diamond drilling tools" (Moscow, VNIIBT, 1979).

Another very large reserve in raising drilling efficiency is the wide introduction of new complexes of technical facilities: drill bits of the GNU series in combination with low rotation speed and other engines (helical, reducer turbodrills and electric drills).

Close cooperation between collectives of the VNIIBT, its Perm affiliate and industrial experimental research departments along with drill workers of the "Tatneft'," "Bashneft'," "Udmurtneft'," and others facilitated the successful introduction of these complexes which drilled about 2 million meters of rock. The amount of sinking with these drills for an equal or even somewhat

greater mechanical drilling speed is greater than the usual turbine drilling using GV and TsV series drill bits.

Thus, at the Arlanskaya group of areas (Neftekamskoye UBR of the "Bashneft'" Association), series GNU drill bits, 190.5 mm in diameter, in combination with D2-172M helical engines, drilled a number of wells with high technical-economic indicators: drill consumption was reduced to a third (6 drills were used), commercial speed was increased by 35 to 48% and operational costs per meter of sinking were reduced by 27 to 35% as compared to the turbine drilling method.

At areas of the Belebeyevskiy, Ishimbayevskiy and Ufimskiy UBR, when drilling with a combination of helical engines, series A-GTSh reducer electric and turbine engines, and series GNU drill bits, an increase in the sinking speed of 1.5 to 3 times per drill was obtained for an equal or greater speed of sinking, and an increase in the run speed of 1.5 to 2 times on the average, and a reduction in the operating cost per meter of sinking averaging 25 to 32% as compared to the usual turbine drilling.

Similar high indicators were obtained when operating series GNU drills in combination with helical D1-195 engines at "Tatneft'," "Permneft'," "Udmurneft'," etc.

Good results were obtained also when using series GNU drill bits in combination with multisectional turbine drills at the "Belorusneft'" Association and in combination with turbine drills with floating stators in Western Siberia.

Another important reserve for raising technical-economic drilling indicators is the maximum utilization of the resource of the drill. An analysis of the condition of the drills used indicated that 30% and more are raised from the wells prematurely for various reasons and, in most cases, are not used again although the drills are still fit for work. This reduces the work indicator of the drill and affects drilling indicators negatively. Experience of leading workers of the "Tatneft'," "Bashneft'," "Permneft'," "Belorusneft'," "Ukrneft'," etc. attests to the fact that full utilization of the drill life by repeated use of drills not fully worn makes it possible to increase sinking per drill by 10% and more per well on the average.

2291
CSO: 1822/156

SYNOPSES OF ARTICLES IN 'AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO NOV 82

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 11, Nov 82 pp 63-64

UDC 622.279.1/4

A METHOD OF EVALUATING THE FORMATION PRESSURES AND GAS RESERVES OF GAS-CONDENSATE DEPOSITS

[Synopsis of article by M.T. Abasov and F.G. Orudzhaliyev, pp 7-9]

[Text] The article proposes a method of evaluating the gas reserves of gas-condensate deposits which is a modification of the known method of evaluating reserves according to decline in pressure. The method is applicable to conditions of two-phase reservoirs. 5 references.

UDC 622.276.652

DETERMINING THE INCREASE IN PETROLEUM OUTPUT AS A RESULT OF STEAM INJECTION AND SUBSEQUENT FLOODING

[Synopsis of article by I.M. Dzhazhalov and G.C. Kambarov, pp 9-12]

[Text] Results of steam injection and subsequent flooding in the Khorasany area are presented. The article gives mathematical formulas for forecasting petroleum output. A comparative analysis of this process with that of developing the area based on depletion drive is given. 2 illustrations, 2 references.

UDC 622.276.031:532.5.001

NONSTATIONARY FLUID FILTRATION IN A RADIAL POROUS RESERVOIR

[Synopsis of article by A.G. Kepimov, pp 12-14]

[Text] Filtration of homogeneous fluid in a circular, infinite fractured porous reservoir is examined. Precise and asymptotic formulas for pressure drop are obtained. Computer programs are developed and numerical calculations made of the walls of the well using the formulas. Results are compared with existing approximate formulas and corresponding conclusions are drawn. 2 illustrations, 4 references.

UDC 550.4[551.411:553.982]001.5 (479.24)

STUDYING TRACE GOLD CONTENT IN THE OILS OF AZERBAIJAN

[Synopsis of article by R. Kh. Mirzoyev and V.M. Kharitonov, pp 13-18]

[Text] Study of Azerbaijan oils with respect to their gold content has shown that gold is present in all oils, and its content varies from 0.3 to 10.5 milligrams per ton. The quantity of the examined element increases, usually with stratigraphic depth, in the oils of various strata of some deposits. There is usually more gold content in heavy oils enriched with resins, asphaltenes, and sulphur, than in light oils. However, this rule does not always hold true; there are deviations from this established relationship. 2 tables, 6 referenes.

UDC 553.982:551.24:550.831 (479.24)

METHODS AND RESULTS OF COMPREHENSIVE ANALYSIS AND PROCESSING OF DATA ON SEISMIC PROSPECTING BY THE COMMON DEPTH POINT METHOD ['MOGT'] USING A PRIORI GRAVIMAGNETIC INFORMATION TO STUDY THE STRUCTURE OF MESOZOIC DEPOSITS OF THE SREDNEKURIN BASIN

[Synopsis of article by I.O. Tsimel'zon and T.S. Amiraslanov, pp 18-23]

[Text] The article examines the methods and results of comprehensive analysis and processing of gravimagnetic and seismic data in studying the structure of Cretaceous deposits of the Srednekurin Basin. The method used is iterative, consisting of constructing working models of the media according to gravimagnetic data of improved accuracy, and subsequently refining the model according to the results of detailed analysis of seismic data. A number of additional details of Cretaceous deposit tectonics were obtained from the structural diagram procedure. Information was derived in accordance with composite data from gravimagnetic and seismic prospecting, and using multivariate regression analysis, as opposed to the structural diagram compiled only from seismic data. 4 illustrations, 7 references.

UDC 622.24.051.553

DEFINING THE PARAMETERS OF ROTARY DRILLING MODES

[Synopsis of article by A.A. Faradzhev and R.N. Shakhmaliyev, pp 24-26]

[Text] Performance results of worn tricone and three-way drilling bits and experimental research on defining the parameters of rotary drilling modes in the Karabagly, Talabi and Sazhdag areas are presented. Reasons for declines in drilling bit performance indices are specified, and recommendations for increasing the efficiency of bore hole drilling are developed. The empirical relationship of mechanical speed to axial load and the speed of bit revolution is determined by the procedure. 1 illustration, 1 table, 2 references.

UDC not given

A COMPARISON OF CLAY ROCK SWELLING AND STABILITY FACTORS

[Synopsis of article by V.S. Voytenko, N.B. Ponomareva, V.D. Tur and A.F. Usynin, pp 26-31]

[Text] A comparative experimental assessment of the indices of swelling and stability of various types of clay is provided. It is shown that the use of swelling data alone to forecast the behavior of clay rock in bore hole walls may lead to an erroneous conclusion. 4 illustrations, 2 tables, 7 references.

UDC 628.543.92

INVESTIGATING POSSIBLE USES FOR DRILLING WASTE MATERIALS

[Synopsis of article by R. Sh. Fatiyeva, I.A. Mamedov, L.A. Abduragimova, and others, pp 31-33]

[Text] The composition and physical and chemical characteristics of surplus drilling mud and cuttings weighted with barite is investigated. Claydite was obtained and studied using drilling cuttings containing a primarily clay base with organic admixtures. Optimal conditions were worked out for enriching drilling mud with barite using the electrophoresis method. A white lithopone pigment whose color met the All-Union State Standard quality norms was obtained from the enriched drilling mud. The potential use of drilling waste materials in the economy was demonstrated. This is especially important in preventing environmental pollution. 1 illustration, 3 tables, 4 references.

UDC 622.279.031

DETERMINING THE BOTTOM HOLE PRESSURE OF AN OPERATIONAL GAS AND GAS-CONDENSATE WELL

[Synopsis of article by Yu. V. Yusifov, Z. Ya. Abbasov, pp 34-36]

[Text] Simpler formulas were obtained using linearization and recommended for practical application. These allow to determine the values of bottom hole pressure, depending on the structural features of the oil string, temperature gradients, and the relationship of the fluid and gaseous phases in the overall flow. 3 tables, 6 references.

UDC 628.1:665.045.5

A SCHEMATIC DIAGRAM FOR USING HEAT LOST IN OIL REFINERY AIR COOLERS

[Synopsis of article by N.D. Aliyev and E.E. Ramazanova, pp 39-42]

[Text] Research results on replacing air coolers installed at oil product flows with high temperature (to 358°C) X-PT type water cooled heat exchangers. A description is given of a new in principle double-flow diagram of a thermal

circulating cycle which uses heat lost in air coolers to obtain heat generating water and chilled water for the needs of the industrial equipment and the nearby housing development. Calculations presented show that there is a 40,000 ton annual savings of standard [reference] fuel from this replacement, or 900,000 rubles expressed monetarily, including accounting for capital expenditures. 1 illustration, 1 table, 4 references.

UDC 665.63.033.22.61.03.001

OBTAINING AND RESEARCHING PRODUCTS OBTAINED FROM OLIGOMERIZATION OF ETHYLENE AS AN INHIBITOR OF PARAFFIN FORMATION AND STIMULATOR OF CRUDE OIL FLOW

[Synopsis of article by A.M. Bayramov, T.M. Aliyeva, A.P. Guseynov, and others, pp 42-46]

[Text] Results of research on products obtained from oligomerization of ethylene in a catalization system consisting of metallic aluminum and isopropyl chloride (IPKh). Products from oligomerization of ethylene were used to inhibit paraffin formation, and also to stimulate the flow for Sangachaly paraffin crude oil. The research showed that the reagent leads to a significant reduction in viscosity and in the dynamic yield point, and also reduces the congelation temperature and prevents paraffin formation. 3 illustrations, 4 tables, 5 references.

UDC 621.622.276:621.8:622.24.054.23

OPTIMUM DESIGN OF CONVERTER FOR BEAMLESS PUMPING UNITS

[Synopsis of article by I.K. Karayev, pp 47-51]

[Text] The article indicates that the recommended kinematic relationships $\frac{\Gamma_0}{\Gamma}$, $\frac{P}{\Gamma_M}$ deriving from known research in practice do not always allow the mechanism's components to turn freely. To prevent this it is necessary additionally to graphically check the relative layout of its elements and make certain changes of the calculated linear and angular dimensions, which cause some loss of operating efficiency of the unit's strut. It was concluded that the recommended relationship values that ensure minimal dynamic load and dimensions of the mechanism, do not consider the structural features of the SBM's [beam pumping unit] converter. The question of determining the optimal values for kinematic relationships is examined, and an elaboration of an analytic method for designing a converter mechanism is given. An example is provided for determining optical values of kinematic relationships for the SBM converter. 1 illustration, 1 table, 4 references.

UDC 622.276.53

INVESTIGATING THE INFLUENCE OF THE 1AGG-10 HYDROPNEUMATIC SHOCK ABSORBER ON THE OPERATION OF SUCKER RODS

[Synopsis of article by M.M. Bagirov, pp 51-53]

[Text] The article establishes that the 1AGG-10 shock absorber most effectively reduces the amplitude of the load on the rods, and lessens the magnitude of stress. Using a shock absorber of this type can reduce the breakdown rate of sucker rods. 1 illustration, 1 table, 3 references.

UDC 622.323.(091)

THE HISTORY OF THE DEVELOPMENT OF POWER OIL PRODUCTION TECHNOLOGY IN RUSSIA

[Synopsis of article by E.M. Ali-zade, pp 54-57]

[Text] The cause and effect relationship of the historical development of the technology of powered oil production mechanisms, oil drilling and production rigs in Russia from ancient times until nationalization of the petroleum industry in 1920. The evolutionary nature of the shift from muscle-powered equipment to the nonadjustable, mechanical power equipment with various types of motors (as determined by the diverse nature of the economy) is established. 6 references.

9069
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SYNOPSES OF ARTICLES IN 'AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO' DEC 82

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 12, Dec 82 p 72

UDC 622.276.1/4 (479.24)

SOME LAWS GOVERNING WATER ENCROACHMENT IN WELLS OF I STRATUM POOLS OF THE MISHOVDAG FIELD

[Synopsis of article by L.A. Buryakovskiy and V.N. Lunina, pp 14-19]

[Text] Data is correlated concerning water encroachment in wells of Mishovdag field. Both the hypsometric position of the well screen and the time that exploitation began are important in evaluating the nature of water encroachment. Logical curves having a time dependent coefficient of proportionality may be used for analytical description of the water encroachment process. 4 illustrations, 1 table.

UDC 550.834

SOME FEATURES OF SEISMIC PROSPECTING METHODOLOGY IN THE KURY-IORI INTERFLUVIAL AREA OF WESTERN AZERBAIJAN

[Synopsis of article by V.T. Avanesiv, pp 23-27]

[Text] Seismic prospecting methodology issues utilizing results of operations in the Kury-Iori interfluvial area that is characterized by complex seismological conditions are examined. An assessment and recommendations are made concerning scheduling of observations, recording times, observation procedure, contour systems, and interpreting seismic profiles. 2 illustrations, 7 references.

UDC 553.982.04.003

A STATISTICAL METHOD FOR FORECASTING FREE GAS RESERVES

[Synopsis of article by S.A. Pogosyan, pp 27-31]

[Text] Versions of a statistical method of forecasting reserves of free gas are examined. The deterministic method is rejected since using empirical formulas leads to approximations of a purely statistical nature. The proposed method is illustrated with a specific example of evaluating free gas reserves. 2 illustrations, 3 tables, 7 references.

UDC not given

FORECASTING CLAY ROCK STABILITY IN BORE HOLE WALLS BY HYDRATION PRESSURES

[Synopsis of article by V.S. Voytenko, pp 36-40]

[Text] Results are presented of research on determining hydration pressures caused by water adsorption intake in clay rock. The relationship of hydration pressures, temporary resistance to breakdown, spherule viscosity, and angle of internal friction on relative moisture content and the number of molecular layers in the clay, and the link between hydration pressures and the time required for breakdown of clay samples in distilled water under conditions of uniaxial loading are investigated. The capability is demonstrated to forecast the stability of argillites and hydrous mica clays with small specific surface in bore hole walls by hydration pressure determined according to the proposed formula. 2 illustrations, 1 table, 5 references.

UDC not given

THE STATUS AND PROSPECTS FOR IMPROVING PETROLEUM PREPARATION IN THE AZNEFT' OIL ASSOCIATION

[Synopsis of article by M.D. Nasirov and Ch. Yu. Garadzhamirli, pp 42-47]

[Text] The condition of petroleum preparation equipment and technology in the Azneft' Petroleum and Gas Production Administration Association is examined. It is demonstrated that introducing a technological regulation improved annually the quality of petroleum produced. Factors influencing the effectiveness of petroleum demulsification, especially of high-viscosity and trapped oils, are investigated. Measures are recommended to improve petroleum preparation in the Azneft' Petroleum and Gas Production Administration Association.
4 illustrations, 1 table, 6 references.

UDC not given

RESEARCH ON DEVELOPING A METHOD OF ELIMINATING UNCONTROLLED OIL AND GAS BLOWOUTS

[Synopsis of article by R.M. Khasayev, T.G. Voskanov, A.T. Abbasov and F.M. Aliyev, pp 47-50]

[Text] Experimental and analytical research is conducted to increase efficiency, ensure labor safety, and protect the environment when eliminating uncontrolled blowouts, by developing, a permanent plug controlled by an electromagnetic field in the pipe subjected to blowout. The relationship of the required power for capping the blowout to the concentrations of magnetoconducting substances in the fluid pumped into the spouting bore hole, and the blowout flow rate is established. Experimental results are confirmed by analytic research. A method of capping uncontrolled blowouts was developed based on the research.
2 illustrations, 2 tables, 4 references.

UDC not given

PROBLEMS OF IMPROVING METHODS FOR DESIGNING FIXED OFFSHORE PLATFORMS

[Synopsis of article by R.A. Gadzhiyev, F.S. Samedov, V.G. Sariksov and others, pp 51-54]

[Text] The main problems of designing fixed offshore platforms for developing deep sea areas of the continental shelf are examined. The need to develop new methods of determining stress resulting from external influences (wind, wave, current, seismic and ice) is well founded. The main trends are defined in experimental, theoretical and developmental efforts related to solving optimum design problems of deep sea fixed platforms, and working out modern standards and specifications for planning the construction of fixed offshore platform structures. 6 references.

UDC 665.52.529

OPTIMIZING THE PROCESS OF INITIAL REFINING OF CRUDE OIL WITH ALLOWANCE FOR THERMAL FEEDBACK DURING PROCESSING

[Synopsis of article by T.I. Kopysitskiy, I.I. Lev, and S.R. Rasulov, pp 58-61]

[Text] A solution is examined to the problem of optimizing the initial crude oil refining process; i.e. maximizing the total production of light products. Processing feedback caused by preheating petroleum is studied in regression models of the process. Applied LPS ES series computer programs are used to solve the problem. Results show that load temperature K-1, which characterizes the influence of processing feedback, equals the initial boiling point of the resource, which is the optimum variant from the point of view of heat used and product recovered. 1 illustration, 2 tables, 3 references.

UDC 665.637.6

OPTIMIZING THE DESIGN OF EQUIPMENT USED IN SEPARATION (SETTLING) OF CRUDE OIL EMULSIONS

[Synopsis of article by A.G. Rzayev, pp 65-67]

[Text] A methodology is developed for calculating the optimum design of sedimentation tanks, that consider the hydrodynamics of the settling process and the effectiveness of an intermediate emulsion layer. The use of redesigned APO [oil settling equipment] improves the quality of the end product by approximately four times, reduces by half the expenditure of chemical reagent, and saves 100,000 rubles per year. 2 illustrations, 2 references.

9069
CSO: 1822/180

PIPELINE CONSTRUCTION

OIL AND GAS CONSTRUCTION MINISTER B. Ye. SHCHERBINA DISCUSSES ACHIEVEMENTS, PLANS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 2, 1983 pp 2-5

[Article covering presentation by B. Ye. Shcherbina, no author listed: "Use Reserve Construction Capabilities to the Maximum"]

[Text] Collectives of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] fulfilled the program of contract construction and assembly work for 2 years of the 5-year plan on 6 December 1982. Technical reequipping, improving the economic mechanism, and introducing the achievements of scientific and technological progress enabled the volume of construction and assembly work to be increased during these years by more than 1 billion rubles, i.e., 26 percent. The increase during the entire 10th Five-Year Plan was 630 million rubles. Capacities were put into operation which insure exceeding the planned volumes of gas output and petroleum delivery. In 2 years more than 20,000 km of main pipelines were laid. Labor productivity in this construction increased by 11 percent, as opposed to the planned 7.5 percent.

Branch sections achieved high indices in socialist competition in honor of the 60th anniversary of the USSR. Many Minneftegazstroy organizations and enterprises have successfully fulfilled their 1982 tasks. The plan for contract work for the second year of the 5-year plan was completed by 20 December.

Striving to also mark the 3d year of the 11th Five-Year Plan with a high labor tempo, the builders of petroleum and gas industry enterprises are working on a broad front on pipeline routes and ground construction sites. The collectives which, for their successes in socialist competition, have earned the high award of the challenge Red Banners of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Trade Union Council, and the Komsomol Central Committee, are examples of highly productive labor.

The main resources of the branch are concentrated on the most important targets of the 5-year plan. The resolutions of the November 1982 CPSU Central Committee plenum and the seventh session of the USSR Supreme Soviet direct the ministry's sections to further intensify construction production and improve its quality. Measures to implement these resolutions were discussed at the expanded session of the Minneftegazstroy staff and at the central committee presidium of the trade union for workers in the petroleum and gas industry.

B. Ye. Shcherbina, minister of USSR Minneftegazstroy presented a report entitled "Tasks of Ministry Organizations and Enterprises To Fulfill the Decree of the November 1982 CPSU Central Committee Plenum and the Resolutions of the Seventh Session of the USSR Supreme Soviet."

Comrade B. Ye. Shcherbina emphasized that the November 1982 CPSU Central Committee plenum oriented the workers toward accelerating scientific and technological progress; strengthening the intensification of social production; increasing economic efficiency; using every available opportunity to improve management; increasing labor productivity and product quality; observing the strictest possible economizing and thrift; fulfilling the Food Program; increasing output of consumer goods; improving the living standards of Soviet citizens; developing significantly the fuel and energy system; improving transportation, especially rail; and strengthening state and labor performance discipline in each industrial branch and in all managerial spheres.

Comrade B. Ye. Shcherbina stated that these guidelines are a concentrated expression of present economic strategy, policy and organization. It is the business of the branches, enterprises and organizations to find specific ways of implementing party instructions, and to adopt comprehensive measures to insure the successful fulfillment of the tasks of the third, central, year of the 5-year plan.

The experience of branch enterprises and organizations shows convincingly that where work is carried out creatively, leaders and specialists strive for innovations, and labor and management are well organized, achievements cannot help but occur. One of the important tasks of the new 5-year plan has been solved through initiative and creativity--increasing speed of the composite pipeline construction lines working on 1,420 mm diameter main lines. The collective of the line led by Comrade Mikhel'son laid 206 km during the year; that of Comrade Pen'yevskiy--199 km; Comrade Buyankin--181 km; Comrade Gevorkyan--16 km. The 100 kilometer barrier, which a few years ago seemed almost unachievable, was also surpassed by the lines led by Hero of Socialist Labor Comrade Shaykhutdinov and Comrades Belyayev, Vinokurov, Rekoshetov, Gubitskiy, Sapozhnikov, Pustovalov and Kernitskiy.

Speaking of the achievements of Minneftegazstroy collectives during 2 years of the 5-year plan and in 1982, Comrade B. Ye. Shcherbina noted that the favorable results show that the branch has developed a correct program for improving capital construction, and has done a great deal to put it in operation. On the other hand, there are also shortcomings. The plan for commodity production was not fulfilled, and as before delays at petroleum industry sites have not been eliminated. The increase in power available per worker exceeds that of labor productivity. There are instances of low quality construction; breaking deadlines for opening up facilities, especially compressor and pumping stations; lack of overall supervision, etc. This shows poor use of the potential and capabilities of the branch, and that a number of major technological and organizational problems are still not solved.

Results of the comparative analysis of the Gryazovets, Petrovsk and Novopskov gas pipeline construction confirm a constantly increasing tempo. On the

Urengoy-Gryazovets main line productivity was 8.3 km per month, and on the Urengoy-Petrovsk and Urengoy-Novopskov pipelines it increased to 9.1 and 10.4 kilometers per month respectively. On the export gas pipeline each line is working at an average output of 15 km per month.

However, substantial differences are revealed in the activities of individual sections. If the increase in line productivity at Glavtrvboprovodstroy [Main Administration for Pipeline Construction] exceeds the branch average by 40 percent, and that of Glawostoktruboprovodstroy [Main Administration for Construction of Pipelines in the Eastern Regions] corresponds to this, but at Glavsitruboprovodstroy [Main Administration for Construction of Pipelines in Siberia] there has been a tendency for productivity to decline. The difference in indices between lines is significant. The best ones provide 25-30 km per month (up to 45 km when working two shifts), but a third of them accomplish only one-third to one-fifth as much. Lack of synchronization continues to exist in accomplishing individual operation when building original structures on the principle of technological specialization. Consequently, the shift to a progressive management structure, which is based on stage-by-stage specialization, on the whole has not yet been completed.

Not all reserve pipeline construction capacities have been used on the export gas pipeline route, although 1.5 times more has been done there than scheduled.

B. Ye. Shcherbina stated that everyone is pleased with the high, ahead of schedule pace of operations on the export gas pipeline, and will be justifiably proud that a great deal has been done to break the embargo of the Washington administration. But the conflict with Washington did not end with the lifting of the embargo. Only its reliance on use of crude pressure collapsed. The political importance of the export pipeline did not lessen, but rather increased. Any political matter is accomplished through concrete actions. Our task is to use the political attitude and patriotism of the Soviet people, and give them specific goals and bench marks to encourage them to solve key problems. It is in precisely this way that the mobilizing role of the economist must be displayed. He is called upon to lead the collectives and be an organizer of this great state project. Both educational work and competition must be oriented toward this. Solutions must be sought tirelessly and everywhere which will make labor and all activities highly effective.

An important reserve for increasing efficiency is by reducing the length of construction preparation and finishing-up periods. Currently time is apportioned so that the main period of work comprises 35-50 percent, while the preparation and finishing up period takes 50-65 percent. Such a distribution of construction work periods is inefficient. It is necessary to shift to building two major pipelines per year, and to keep the rate of building multipurpose 1,420 mm diameter pipelines at no less than 5,000 km per year.

Eliminating delays in ground site construction presents still more significant latent opportunities for reducing the time required to build facilities. Among the reasons that schedules for putting a number of compressor and pumping stations into operation have been disrupted are the lack of necessary engineering preparation of production, untimely equipping of sites and living settlements,

delays in delivering materials, poor equipping with sets of materials, etc. Strict observance of technological procedures, and providing subcontractors' work to the front in a timely manner are important in increasing the tempo of ground site construction. It is necessary to increase the capability for erecting prefabricated facilities and to develop the base of many construction trusts.

Comrade B. Ye..Shcherbina emphasized further that the main latent opportunities to increase efficiency, as was mentioned at the November 1983 CPSU Central Committee plenum, should be sought through rapidly and extensively introducing into production the achievements of science, technology and advanced experience. It is not possible today to work economically without taking advantage of the heights of scientific and technological progress. This is relevant both to social production as a whole, and to individual branches, organizations and enterprises.

During the last 5-year plan, the institutes and construction bureaus of the ministry were able to put into operation more than 170 scientific and technological developments. In 1982 they succeeded in fulfilling the overwhelming majority of measures for improving the technological level of the branch. It is necessary that the adopted state program for scientific and technological progress become an operative, specific plan for all organizations and each worker. It is well known that there is no monopoly on creativity, and that practically any specialist can and should contribute to this main direction for developing the economy of the branch.

Slow introduction into mass production of a number of progressive developments, in particular a system for contact welding, has become a basic shortcoming. Delays are occurring in developing measures associated with pipelaying in permafrost, and with implementing programs for year-round construction in the Central Ob' and in Northwestern Siberia. Ultrasound methods to monitor welding quality are not being introduced fast enough.

Branch scientific research institutes and design bureaus still must do a great deal to improve construction quality; increase the effectiveness of repair services; speed up the technical re-equipment of in-house production base enterprises; mechanize and automate loading and unloading, and thereby eliminate excessive waiting time for transport resources; and insure safe working conditions. Technical re-equipping of the branch must be accompanied by a sharp improvement in industrial hygiene and safety practices.

The main production administration, along with the scientific and technological design organizations, must work out additional measures to sharply improve gas pipeline construction quality and on-the-job safety, confirm them in the central board staffs, and insure they are implemented. The Urengoy-Pomary-Uzhgorod gas pipeline must be placed under special control.

The November 1982 CPSU Central Committee plenum directed attention toward thorough, more complete use of on-hand equipment and other resources. This instruction, noted Comrade B. Ye. Shcherbina, is especially meaningful for our branch, which is being qualitatively re-equipped. The power available per

worker increased during the 10th Five-Year Plan and the first 2 years of the 11th Five-Year Plan from 24 to 34 kilowatts per worker, and, counting the next equipment, will reach 42-44 kilowatts in 1985. It is still higher in pipeline construction. However, it has not been possible to fully integrate the rearrangement of the economic mechanism with technological re-equipping. The overall increase in output has been 6-14 percent. The branch daily use of pipe layers, cranes, excavators and bulldozers has averaged 10.5 to 11.5 hours--a little more than 1.5 shifts.

Further development of the branch depends decisively on using and technologically re-equipping productive capacities for reinforced concrete, metal construction, and prefabricated structures. Nevertheless, the capital investments plan is not being fulfilled for production base enterprises or the construction materials industry, due to a slow construction pace. Sites involving technological re-equipping have been unsatisfactorily built. Construction industry enterprises have significant latent capabilities for reducing manual labor. It is necessary to increase the level of automation in preparing concrete mix and mortar, and improve the use of concrete mixing equipment.

The problem of eliminating excessive idle time for transport equipment, especially railroad cars, is still not solved. There is disorder in water and truck transport and in the use of aviation.

It was emphasized at the November 1982 CPSU Central Committee plenum that today a relevant question concerning our plans is whether they show a zealous regard for the people's welfare. B. Ye. Shcherbina paid a great deal of attention in his report to economizing material and technological resources. More than 60 percent of the workers of the branch took part in the All-Union Public Review and Competition on Efficient Use of Raw Materials, Materials, Fuel and Energy Resources. The implementation of 9,000 proposals received during the review has made it possible to save 11,000 tons of rolled metal, 24,000 tons of cement, and 4.5 million kilowatt hours of electric power.

At the same time, this advanced experience has not become the norm for all production collectives. Inefficient expenditure of materials and squandering of socialist property occur in a number of organizations. The report examined intolerable facts of mismanagement; unfilfillment of tasks for economizing on cement, rolled ferrous metals and gasoline; writing off "lost" or ruined equipment for significant sums; transfer of machinery to outside organizations; overspending the wage fund, and other such things.

The November 1982 CPSU Central Committee plenum named speeding up work on improving all spheres of economic leadership, management, planning, and the economic mechanism as one of the necessary conditions for the economy to become truly economical. The party has set a task of creating an organizational, economic, social, psychological and legal situation in each collective which will stimulate high quality, productive work, initiative and enterprise, and, on the other hand, not accommodate poor work, idleness and irresponsibility.

The Minneftegazstroy is implementing a long-term program for improving the economic mechanism. The effectiveness of this mechanism is a main factor in achieving favorable results of the branch's work.

Most serious attention should be paid to strengthening plan discipline. It is impermissible for the very same subject areas to move about year after year in the plans of the very same trusts. The fact that a number of organizations delay construction of residential housing, schools and children's preschools cannot be tolerated.

In subjecting to criticism individual trusts, central boards and associations whose leaders lack self-discipline and efficiency, Comrade B. Ye. Shcherbina noted the need for strict fulfillment of obligations which are undertaken. Being true to one's word is the highest obligation, responsibility and form of human decency.

In perfecting the economic managerial mechanism, particular attention must be paid to improving it in pipe laying trusts. Four lines in the Main Administration of Pipeline Construction are successfully conducting an experiment in introducing advanced organizational structures and a variable wage system. These lines increased the rate of laying main gas pipelines by 50 to 100 percent (20-25 km per month) by comparison with the rates achieved before shifting to the production line method of construction. Output increased an average of 35-40 percent. The tendency was enhanced for work to be accomplished by fewer workers and fewer separate professions.

Results of the experiment in the Ukrtrvboprovodstroy [Ukrainian Pipeline Construction Trust] and ZUST [Transcaucasus Administration for Pipeline Construction] also show that the shift to a new measure of work significantly improves technical and economic indices. Ukrtrvboprovodstroy increased the quantity of pipelines placed in operation by 25 percent. Commercial construction products increased 63 percent in ZUST. In one year the output in Ukrtrvboprovodstroy and ZUST rose 42 and 44 percent respectively. The average time required to build main pipelines was reduced by almost 20 percent. In both organizations cost price was significantly reduced profit was increased, savings were achieved in the wage fund, and construction quality was improved. The influence of the new measure of work facilitated the successful completion of previously "unprofitable" work (curved sections, crossings, compartments for putting scrapers into service, small diameter pipelines, and others).

The use of construction equipment has improved significantly. Thus, in the Ukrtrvboprovodstroy the shift coefficient increased 10 percent, the coefficient of use of the annual machine-time fund rose 14.3 percent, and the productivity of primary machines calculated by unit of power went up by almost 3 percent. An increase was achieved in output on capital for the active portion of the production funds.

Shifting to finished products has made it necessary to adjust the initial per-item calculation of expenditures and results.

Based on this experience the ministry had the opportunity to introduce on a mass basis the index of standardized representative finished production. It is envisioned that in 1983 the Main Administrations for Construction of Petroleum and Gas Industry Enterprises in the Ukraine, the Pipeline Construction in Southern Regions, the Gas and Petroleum Industry Enterprises in the

Komi ASSR, the Interrepublic Gas Enterprise Construction Association, and the Tatar Construction of Petroleum Industry Enterprises Association will shift to the new measure. Before the end of the 5-year plan the branch as a whole must have shifted to this measure.

Much must still be done in planning, budgeting and contracting work to further improve the economic mechanism. It is necessary to fulfill party and governmental instructions rigorously to include in the plan only those items which have documentation and resources. It is necessary to take stock of violations of agreed obligations and to strictly control the observance of agreements. Effective measures are also required to increase the profitability of construction.

Comrade B. Ye. Shcherbina examined in detail the 1983 tasks, and he analyzed the special features of the plan for the 3d year of the 5-year plan.

Ministry organizations must accomplish a 5 billion ruble construction program.

Contract work will increase by 9.2 percent over the 1982 plan; almost 15 percent in Western Siberia.

The plan calls for more than 10,000 kilometers of gas pipelines, petroleum pipelines and petroleum products pipelines to be put in operation. Seventh compressor and pumping stations, 1.2 million cubic meters of petroleum volume, more than 9,000 km of cable and radio relay communications lines and other production items are to be built.

The year 1983 is a year of the branch's highest vistas. It is also the year the export gas pipeline will enter into operation with 17 compressor stations.

The year 1983 for the branch is also the year for completion of the maximum amount of work in Western Siberia, and for its unprecedented scope in the Urengoy field. It is necessary to develop greater capacities here for gas accumulation and preparation. Simultaneously, the capability to increase output by 20 million tons of petroleum will be built in Siberia.

It is necessary to expand work on the Yamburg field.

Glavvostoktrvboprovodstroy and Glavsibtruboprovodstroy must work out organizational and technical measures to prepare to build in Eastern Siberia in the next 2-3 years.

The year 1983 is the time construction begins on compressor stations using domestically produced equipment of 16 and 25 megawatts. Coal pipelines also will be laid on the basis of the highest form of organization in the economic mechanism--"turnkey" construction. A significant amount of work is planned on building facilities associated with implementing the Food Program.

It is planned that 817 million rubles will be invested in developing the in-house production base.

Commodity output will increase by 41 million rubles, or 5.5 percent. The volume of standardized finished production will increase by 5.8 percent; that of realized production by 6.3 percent.

The growth in the volume of construction and assembly work and industrial production must be attained by increasing labor productivity without increasing the number of workers.

In order to fulfill the difficult 1983 program, the ministry has decided to implement no less than 26 percent of the annual program during the first quarter, and more than 51 percent during the first 6 months.

The pace of work will not lessen in 1984. It is planned that more than 15,000 kilometers of pipeline will be put in operation.

In conclusion, Comrade B. Ye. Shcherbina stated that a powerful detachment of the working class, talented engineers, and specialists building the petroleum and gas industry has been developed in the country. They are adopting the decisions of our party as their patriotic concern and filial duty, and are doing everything necessary to implement them for the sake of peace and life itself.

The board of Minneftegazstroy and the Central Committee Presidium of the Petroleum and Gas Industry Workers' Trade Union have adopted detailed instructions on the tasks of ministry organizations and enterprises in light of the resolutions of the November 1982 CPSU Central Committee plenum and the Seventh Session of the USSR Supreme Soviet.

The instructions note that the workers of the branch, having adopted the resolutions of the November 1982 CPSU Central Committee plenum and the Seventh Session of the USSR Supreme Soviet as their fighting program of actions, are taking steps to more fully use production reserve capabilities. However, along with the achievements in the work of many ministry organizations and enterprises, significant shortcomings still remain. Established plans for introducing a number of facilities and tasks concerning the most important technical and economic indices are not being fulfilled. Smooth and systematic introduction of residential quarters and cultural and domestic facilities is not being insured. Equipment is still not being efficiently used, and the quality of construction requires significant improvement.

The Ministry Board and the Trade Union Central Committee Presidium resolved to approve fully and completely, accept as guiding principles and strictly execute the resolutions of the November 1982 CPSU Central Committee Plenum and the Seventh Session of the USSR Supreme Soviet, and the provisions and conclusions deriving from the speech of Comrade Yu. V. Andropov, CPSU Central Committee general secretary, at the plenum.

In accordance with the instructions, the leaders of the main administrations, associations, trusts, enterprises and organizations of the ministry, as well as republic, kray, oblast, and city trade union committees are obligated to take specific steps to maximally use production reserves and achieve the highest end results with the least cost.

The Ministry Board and the Trade Union Central Committee Presidium approved measures to fulfill the resolutions of the November 1982 CPSU Central Committee Plenum and the Seventh Session of the USSR Supreme Soviet.

Leaders of main administrations, associations, trusts, organizations, enterprises, and trade union committees have been tasked to strengthen intensification in every way possible and improve production efficiency, to use to the maximum opportunities for improving economic activity, accelerate scientific and technological progress, improve labor productivity, and further improve planning and production management and the style and methods of work.

Maximum concentration of capital investments and material and labor resources on facilities being started up; unconditional and timely entry into operation of industrial plants, including those of the in-house production base; and fulfillment of the planned social program are required. It is necessary to sharply improve construction quality, especially of pipelines; introduce widely modern technological processes, equipment, and means of quality control; adopt industrial methods for building ground facilities (prefabrication); use new efficient construction techniques; and increase the responsibility of executives for the quality of their work. Concrete steps should be taken to strictly economize material and financial resources; observe expenditure norms for fuel, energy, pipe, metal and cement; and better use construction equipment and transportation resources. It is necessary to bring proper order to securing valuable materials, and to resolutely stop instances of mismanagement and waste. It is necessary to strengthen in every way possible state, labor and executive discipline at each production section, to increase self-discipline and efficiency in work, and to realize strict control over the fulfillment of orders, instructions and decisions taken.

The Ministry Board and the Trade Union Central Committee obligated the leaders of the main administrations, associations, trusts, organizations and enterprises to take the necessary steps to prepare all construction elements to fulfill the 1983 program. The main tasks of the 3d year of the 5-year plan are considered to build the Urengoy-Pomary-Uzhgorod gas pipeline, attain planned capacity on the Urengoy-Novopskov gas pipeline, and expand work on building the Urengoy-Center gas pipeline.

In 1983 the following new operational capabilities are to be insured: for the gas industry--more than 9,200 kilometers of gas pipelines; installations for complete preparation of 45 billion cubic meters of gas per year; and initial capabilities to produce gas in the Sovetabad and Uchadzhik fields in Turkmenistan and the West-Soples fields in the Komi ASSR; for the petroleum industry--approximately 300 kilometers of petroleum pipelines, a large number of installations for petroleum preparation and gas pumping complexes, machinery to maintain stratum pressure and intensify petroleum output in the Komi ASSR, Tatariya, Bashkiriya, Urdmurtiya, the Tyumen Oblast and the Lokosov Gas Refinery; complete work on equipping six new petroleum fields, and increase the capacity for utilizing casing head gas in Western Siberia. Two million square meters of dwellings, schools for 17,000 students, and preschools with 9,500 spaces are to be built and put in operation, and measures are to be implemented for building Novyy Urengoy.

The measures which were worked out in accordance with the resolutions of the May 1982 CPSU Central Committee plenum concerning developing existing and creating new subsidiary farms, strengthening their material and equipment base, and increasing agricultural production must be implemented. Special attention is to be paid to winter quartering of cattle and timely preparation of farms for spring field work.

A task has been set of improving the use of railroad cars and reducing their idle time for loading and unloading. It has been decided to support and widely disseminate the initiative of the Moscow industrial, construction and transport enterprise collectives, which have undertaken to accomplish maintenance on railroad cars and containers themselves, and to dispatch them only in a state of good repair.

Leaders of ministry organizations and enterprises and trade union committees are charged to intensify their efforts to organize effective socialist competition in labor collectives, including according to the principle of "workers' races," and to constantly insure that it actively influences the complete use of reserve production capacities and the introduction of advanced experience, and promotes economy in resource expenditures and building and putting facilities into operation ahead of schedule.

The Minneftegazstroy Board and the Trade Union Central Committee Presidium have expressed firm confidence that the workers, engineers, technicians and employees of the ministry's organizations and enterprises will direct all their efforts, knowledge and experience toward solving the tasks set by the November 1982 CPSU Central Committee plenum and the Seventh Session of the USSR Supreme Soviet, and will mark 1983 with new labor achievements.

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PIPELINE CONSTRUCTION

REVIEW OF BOOK BY MINISTER SHCHERBINA

Moscow STROITEL'STVO TURBOPROVODOV in Russian No 2, 1983 pp 47-48

[Unsigned article: "The Main Directions for Developing the Branch"]

[Text] A book by B. Ye. Shcherbina, minister of the Ministry of Construction of Petroleum and Gas Industry Enterprises entitled "Main Pipeline Transport at the Outset of the 1980's" (Moscow, "Nedra", 1982) has been published.

Generalization of the present status and development of domestic main pipeline transport and its role in the country's economy are the main themes of the book, which undoubtedly are of interest to a wide circle of readers.

The need to speed up the development of energy and the chemical industry, industries which determine the speed of increase of material production and national income of the USSR, required that a large-scale construction program be fulfilled by the specialized branch for equipping petroleum and gas industry enterprises created in the early 1970's.

The system of measures for implementing this program which was presented in the book shows how advanced the current level of construction is, and how closely it is linked to the main achievements of technological progress.

A common policy on equipment which reflects the specifics of mobile construction and considers the difficult conditions of Western Siberia, its main region, was made the basis for implementing production programs. A fundamental restructuring of the petroleum and gas construction industry was carried out, which increased its efficiency.

The main principles for organizing construction in Western Siberia are: maximum industrialization, flow-line production, prefabrication, interregional use of labor resources, and planning and evaluating the activities of enterprises and organizations according to end-product.

During the 10th Five-Year Plan, scientific achievements in the branch became direct production forces. New and powerful vehicles, machinery and equipment were manufactured. Methods for accomplishing technological operations were improved. Welding efficiency was increased. Reliable methods for testing welded seams were developed. Ultrasound equipment for checking the quality of welds, and stands for fluoroscopic testing were introduced. The level of testing of welded joints for 1,020-1,420 mm diameter pipes is now 100 percent.

New insulation materials have been introduced which reliably protect pipelines from corrosion.

Measures to increase the level of industrialization of on-the-ground construction based on using prefabrication methods have had a significant effect--418,000 rubles per 1 million rubles of capital investment (not counting the effect in petroleum and gas consumption).

The book shows clearly that a precisely adjusted cycle of science and production helps accelerate the development of the branch.

During the 10th Five-Year Plan, 50,000 km of pipelines, 196 compressor stations and 6.8 million square meters of living space were put in operation. Gas fields in Western Siberia, Orenburg and Central Asia were developed. Super long-range gas transport systems were developed from these fields to the country's center.

The overall length of main pipelines in the 1970's doubled by comparison with the preceding decade, and exceeded 200,000 km. For the first time in world practice, a new technical class of main gas and oil pipelines, rated at up to 7.5 MPa was developed using 1,220-1,420 mm diameter pipes.

The book devotes special attention to the development of Western Siberia. The adaptation of vehicles and transportation to northern conditions is helping to eliminate the seasonal limitations on working in this region and to make labor more intensive and efficient. A significant effect is attained by introducing local cost accounting, and making the composite brigades the structural entities of construction organizations, with end-product construction at the level of primary production units.

Important directions in the construction program include developing the production base in Tuymen' Oblast rayons, using material and labor resources, and developing the social infrastructure of branch organizations and enterprises which are located in inhabited regions.

The section devoted to Western Siberia shows that the difficult natural and climatic conditions of this region make it necessary to search for the optimum decisions in all spheres of the activity of branch organizations and enterprises.

Today Western Siberia is the primary fuel and energy base of the country. The Medvezh'ye, Vngapur and Urengoy gas fields have been fitted out for operation. In the coming years it is planned to place in operation the Yamburg, Zapolyarnoye, Yubileynoye and Kharasaveyskoye fields.

Minneftegazstroy is working on a program for developing construction in Western Siberia until the year 2000, which is aimed at further increasing the efficiency of the pipeline construction system.

The book examines in detail social problems entailed in construction. It shows the growth of residential construction in Western Siberia, where more than 2.5 million square meters of living space have been built. Much has been done to improve living conditions in the settlements along the route. Comfortable

all-metal railroad car living quarters, the "Voskhod" duty station complexes, and medical/preventive-treatment units are used at field settlements. A sports complex including a sports hall and swimming pool has been planned and built.

The last chapter details a large-scale program for further developing the branch. Problems for the foreseeable future include introducing highly productive, automated installations for gas treatment into the gas fields, and equipping the high capacity main lines with a high degree of automation and operational reliability. The quantity of work to be completed during the 11th Five-Year Plan is to exceed that achieved during the 15 previous years.

The construction begun during the 11th Five-Year Plan is unique. The world's first multi-line system of transcontinental main pipelines is being built in a single "corridor."

The world has not previously known such a huge-scale and swift example of developing natural resources.

Technical accomplishments are also evolving rapidly. By 1985, 70 percent of all welding will be automated. New, powerful excavators adapted for work in permafrost and swamps, trench fillers, equipment for recultivating the land, and other machinery is increasing the speed of earth-moving work. More reliable swamp traversing vehicles, high-load capacity platforms on air cushions, 30-ton load capacity block assembly moving equipment, and other such items will be employed.

Main pipelines of 1,420 mm diameter, calculated for 10 MPa will be laid. Prefabricated construction methods will become more widespread.

The book shows the importance of the most rapid development of the petroleum and gas system. The importance of the forthcoming tasks is mobilizing the collectives to fulfill the outlined programs.

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WORK ORGANIZATION ALONG GAS PIPELINE

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 2, 1983 pp 10-12

[Article by N.M. Pavlov, Orgneftegazstroy Scientific Research and Planning Institute: "Work Organization on the Export Gas Pipeline Route"]

[Text] The main gas pipeline Urengoy-Pomary-Uzhgorod is unique with respect to its technological and construction parameters. The quantity of gas transported by the line is equivalent to 15 million kilowatts, which corresponds to the capacity of approximately four Bratsk GESes.

Besides the main gas pipeline there also must be built a 280 km experimental industrial section of multilayer pipes rated for pressures of to 10 MPa, approximately 50 km of reserve line crossings over major water obstacles, almost 110 km of bypass pipelines (loopings), approximately 40 km of connections to the Urengoy-Novopskov gas pipeline, roughly 120 km of loops to compressor stations, connections to future gas pipelines, branches to users and other installations.

The plan envisions building 40 compressor stations and one gas condensation station. Gas pumping will be accomplished by 122 gas pumping units with a total capacity of approximately 2.8 million kilowatts. The metal content of the main line pipes alone is more than 2.7 million tons.

Construction is to be accomplished in an unprecedented short time--deliveries of gas through the pipeline must begin in the first quarter of 1984. Time periods for the step-by-step introduction of the in-line portion of the Urengoy-Pomary-Uzhgorod gas pipeline have been determined.

Constructing such a unique project in record time, and also the prospects for further developing the gas pipeline system on this axis have necessitated concentrating the main resources of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] in the central energy corridor.

For the first time in the practice of pipeline construction, Minneftegazstroy is solving problems of organizing the work of such a myriad collection of builders, and of optimally using resources on a system of gas pipelines extending approximately 4,500 km over the course of a number of years.

Nipiorgneftegazstroy [Scientific Research and Planning Institute for Oil and Gas Construction] has worked out POR [Plan for Work Organization] for the

Urengoy-Pomary-Uzhgorod gas pipeline (I). The POR is a general organizational document for the entire project as a whole, which contains information on workloads, systematizes matters of sequencing and deliveries, and solves specific problems of work apportionment and completion times for various executors.

Working out the POR for the Urengoy-Pomary-Uzhgorod gas pipeline was based on the practice of introducing POR plans at prior projects, which illustrates the need to coordinate all types of organizational activities.

A feature of the POR for the export gas pipeline is that in its consolidated version it is formed from measures worked out and refined by each central construction board. Thus production elements, services of the ministry apparatus, and planning and technological institutes are involved in working out decisions on construction organization.

In examining questions of organizing the construction of the Urengoy-Pomary-Uzhgorod gas pipeline (I) as a component part of the organizational decisions for the system of main gas pipelines of the central energy corridor, Minneftegazstroy divided the route according to the work sections of the construction lines. The length of these sections averages 80-90 km (for regions with a limited construction season section length is 60-70 km; for regions with favorable natural and climatic conditions and year-round work, the length is 110-120 km).

This division remains in force for all gas pipelines of the central energy corridor, making it possible to form future annual programs of construction organizations which will be participating in building these projects practically throughout the entire 11th and part of the 12th Five-Year Plans.

The creation of fundamentally new, major residential settlements with maximum amenities on all sections of the route is helping improve social and domestic conditions. For the first time, settlements are being constructed which are projected to function in one place for several years, with common heat, water, energy and sewage systems. In these settlements, complexes of communal services, clubs, sports halls and swimming pools are envisioned.

The development of strong, permanent production bases, including well-equipped, on-the-line platforms equipped with gantry cranes, rotary welding stands, warehouses and repair stops for construction equipment is acquiring great importance in insuring stability in the work of technological construction lines.

The schedule worked out by Nipiorgneftegazstroy, which takes into account the organizational and technical measures of central production boards, provides for building the line portion of the gas pipeline by 47 composite technological construction production lines. The Main Administration for Construction of Pipelines in Siberia has 11 lines, including a special line for building the Ob' flood-plain section. The Main Administration for Construction of Pipelines in Eastern Regions has 12 lines; that for Southern Regions has 3 lines. The Main Administration for Construction of Petroleum and Gas Industry Enterprises in the Ukraine has 4 lines; the Interrepublic Gas Enterprise Construction Association has 3 lines.

Moving four technological lines to new work sections is planned, in order to insure that the export gas pipeline enters operations ahead of schedule, to develop techniques for maneuvering labor resources of technological lines, and to direct qualified collectives in the winter construction season to individual northern marshy sections of the route.

Nipiorgneftegazstroy is developing plans-targets for completing the main line work by construction lines, trusts and central boards; it also controls the breakdown according to oblasts and autonomous republics. The job plan is adjusted as necessary during construction, takes into account the actual work accomplished and the supplemental increased socialist obligations adopted by the construction collectives.

Winter of 1982-1983 is the most intense and critical period in constructing the Urengoy-Pomary-Uzhgorod gas pipeline, especially for construction organizations working in Western Siberia. Implementation of a number of organizational and technological decisions is planned. Measures to prolong the winter construction season include using elements equipped with specialized road construction equipment to build and operate access roads and roads adjacent to the route; to conduct mandatory freezing of the marshes, and to build ice fords and crossings across streams, which in combination will prolong the winter construction season by 20-30 days.

Technological equipment nodes are set up prior to construction of line segments. Two-shift work is being achieved on the lines of the Western Siberian section of the route. Auxiliary lines are being formed to build technological connections between the Urengoy-Novopskov and the Urengoy-Pomary-Uzhgorod gas pipelines, which provides for timely testing work.

The major portion of a gas pipeline must be tested hydraulically. Construction organizations have acquired experience in hydraulic testing on the Urengoy-Novopskov and the Urengoy-Pomary-Uzhgorod gas pipeline routes. Considering that according to the schedule most of the testing is during subfreezing temperatures, measures are taken to protect line sections and shut-off equipment components from freezing. First of all, this means control over complete and correct burying of the line segment, as well as work to warm pipeline technological components. The creation of elements for engineer preparation of construction, road and transport work, and also for fulfilling main tasks helps increase the comprehensiveness of work being performed. The first two stages are accomplished by PMK [mobile mechanized columns], and the main operations by KhRU [cost accounting section].

The road-building and transportation PMK are charged with clearing the route through the forest; building and maintaining approach roads and access ways along the route, including log roads and obstacle crossings; building areas near shipment reception points; unloading and transporting pipes to welding bases; transporting sections of pipe from welding bases to the route; loading and transporting reinforced concrete weights and anchors; and hauling out commercial timber from the route and shipping it to the consumer. The road building and transportation MMC includes brigades for preparing the route, loading and unloading, and transportation.

The engineering and technological PMK must build crossings under roads and across ravines, small rivers and marshes; assemble crane components, compartments to accommodate purifying equipment, compressor station connecting units, on-shore manifold pipelines and other technological equipment units; clean and test pipelines, and conduct rotary welding at pipe welding bases. The engineering and technological PMK includes a brigade for engineering and technological preparation of construction which works comprehensively to build technologically difficult sections of the route, and brigades for rotary welding of pipes at pipe welding bases, for bending preformed pipes, cleaning housings and testing the pipeline.

The cost accounting section forms brigades for excavation and earth moving, welding and assembly, and insulating and stacking, as well as a specialized brigade for assembling horizontal angles and eliminating technological breaks. Ballasting the pipeline must be accomplished by the excavating and earth moving brigades.

Introduction of new organizational methods where subdivision specialization is based on a specific stage of construction insures a rapid construction schedule. Moreover, forming specialized subdivisions for building and maintaining access ways along the route and approach roads increases the mobility of resources, reduces the demand on transportation, and significantly lessens the expenditure of fuels and lubricants.

The effective work of main sections of the pipeline construction lines is possible only through efficient operations by the trust's service and auxiliary sections. With respect to this, the production structure of the pipeline consturction trust provides for centralized quality control, housing and utilities, machinery repair and maintenance, material and equipment supply, and transportation.

The line's composition and equipment are not constant; they depend on the natural and climatic conditions of the construction region, the transportation plan, and the specific amount of work to be done. For the central regions of the European part of the USSR, which work year-round, the number of workers of the pipeline construction line, plus those of servicing and auxiliary elements, comprises 450-500 people. There are 130-150 people in the road-building and transportation MMCs, and 150-160 in a cost accounting main construction section. The aggregate quantity of primary vehicles and machinery in the line is 170-200.

Elements of the new organizational structure began to be developed in building the Urengoy-Gryazovets, Urengoy-Petrovsk, and Urengoy-Novopskov main lines. In accordance with the decisions of the coordinating council of the goal-oriented production and scientific-technological program, the branch as a whole is to create 34 and reorganize 63 pipeline trust production elements.

To avoid a sharp break in settled organizational structures, especially in Western Siberia, it is planned to create within the framework of the construction and assembly administrations a technological line unit for building 1,420 mm diameter main pipelines.

Presently, three composite technological lines of the Svarochno-Montazhnyy, Kuybyshevtruboprovodstroy and Soyuzgazspetsstroy trusts are successfully working, using the contract brigade method.

Measures to improve work organization will facilitate successfully concluding construction of the export gas pipeline.

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SPECIALIZED PRODUCTION FLOW STAGES

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 2, 1983 pp 12-13

[Article by V.P. Sidorenko, Orgneftegazstroy Scientific Research and Planning Institute and L.V. Mikhel'son, Kuybyshevtruboprovodstroy Turst: "The Effectiveness of Composite Technological Construction Lines Specialized According to Stages of Construction"]

[Text] During construction of the Urengoy-Pomary-Uzhgorod gas pipeline, experiments were conducted on introducing new organizational structures--KTP [composite technological construction lines]--specialized according to the stages of construction.

The experimental results indicate that achievement of a pipeline construction rate in excess of 1 kilometer per day and more than 200 kilometers per year is possible from realizing the advantages of specialization by stage, introducing self-supporting (cost accounting) forms of labor organization, and setting up wage payment according to a uniform scale.

The fullest possible study of the specifics of stage-by-stage specialization and of the forms and methods of mastering it will facilitate broad introduction of composite technological construction lines.

The example of constructing the Urengoy-Pomary-Uzhgorod pipeline section using the composite technological construction line of the Kuybyshevtruboprovodstroy Trust is used to examine the production possibilities of KTP, its structure, the stages of construction work, and the machinery and energy availability on the construction line.

In forming the KTP, the trust's organizational structures were aggregated, which led both to increasing the comprehensiveness of work fulfilled, and to an increase in the level of concentration of labor and material resources. It was envisioned that the end result of the work of the KTP would be to complete all on-line work in the given section. The length of the section is 127 km. It is located between the Volga and Sura Rivers (Chuvash ASSR), and has a complex terrain. The route intersects two railroad lines, 13 roads, 30 buried communication lines, 57 ravines and gullies, and 9 small rivers, with bottom lands of which are badly flooded.

The route's features were considered in working out the composition and structure of the KTP. The KTP structure and composition adopted in the trust permitted implementing by-stage pipeline construction.

During the first stage, road building and transportation work were accomplished by SUZR-5 [prob. "Administration for Specialized Work Services"] specialized elements. These elements included a composite brigade for clearing the route through the forest and laying roads along the route; a brigade for building crossings; and a brigade for delivering pipe and heavy materials to the route, which received a column of pipe delivery vehicles from Motor Depot No 2.

It is planned that in the future the work of the first stage will be accomplished by a mobile mechanized column (PMK).

The first stage work exceeded the construction work of the second and third stages in terms of time and distance. Lead-time was 2 months and the distance outstripped was 40-50 kilometers.

The road-building and transportation section was equipped with the following vehicles and machinery: 1 pipelayer, 2 caterpillar prime movers, 5 single-bucket excavators, 7 bulldozers, 2 welding units, 2 hauling tractors, and 1 water removing apparatus.

The second stage--engineer preparation of the route--was accomplished by two SUMR-5 [Specialized Administration for Mechanized Work] specialized elements. They consisted of brigades for rotary welding and preparation of curved piping, and brigades for assembly of crane components, components for connecting compressor stations, etc. Vehicles and machinery used during engineer preparation of the route included: 8 pipe layers, 3 tractors, 2 bulldozers, 2 crane trucks, 3 welding units, 4 power stations, and 1 pipe bending set.

The third stage includes earth moving, welding and assembly, and insulation and stacking. These main on-line tasks are conducted by a cost accounting section numbering up to 180 persons. All workers and engineering and technical employees worked on the single project wage payment system. The cost accounting section was given the functions of a general contractor. The section was equipped with the following vehicles and machinery: 6 single-bucket excavators, 1 chain-and-bucket excavator, 8 bulldozers, 14 pipelayers, 1 cleaning machine, 7 welding sets, and 6 power stations.

The energy availability of the cost accounting section did not exceed 8,000 kilowatts, and the energy availability of a single worker involved in main on-line work was 50-55 kilowatts.

We compare the indices of energy availability of this cost accounting section with the corresponding indices obtained during construction of the Urengoy-Petrovsk pipeline, where the main on-line work was accomplished by brigades from various construction administrations specialized according to type of work. Construction of the Urengoy-Petrovsk pipeline section was accomplished by the Kuybyshevtruboprovodstroy Trust. The aggregate capacity of vehicles and machinery involved in earth-moving, welding, and installation and stacking

reached 120,000 kilowatts and more, and the energy availability for a single on-line worker exceeded 60 kilowatts. The accelerated construction rates for the Urengoy-Pomary-Uzhgorod section, and the increase in labor productivity and other indices of efficiency were obtained as a result of better labor organization and more complete use of vehicles and machinery, achieved due to specialization of trust elements by stages of construction.

Some technical and economic indices which characterize the increase in labor productivity are set forth in Table 1.

Table 1. Some Technical and Economic Indices of KTP (composite technological construction lines)

Work Periods	Work Periods	6 months	4 months (June-October)
Volume of construction/assembly work (thousands of rubles)	Planned	11,180	6,964
	Actual	10,696	8,899
	Percent of plan	95.6	127.8
Number of workers	Planned	175	152
	Actual	130	152
	Percent of plan	74.3	100.4
Output (Rubles)	Planned	63,886	45,816
	Actual	82,277	58,548
	Percent of plan	128.8	127.8

Labor expenditures per kilometer of the on-line portion of the pipeline during June-October 1982 did not exceed 1,000 man hours, whereas according to calculation of labor expenditures this sum comprised more than 3,000 man hours (traditional method). Table 2 presents data for labor expenditures on main on-line work.

Table 2. Labor Expenditures (in man-hours) in Constructing the Urengoy-Pomary-Uzhgorod Pipeline Section During 15 June-1 November 1982

Work type	June	July	August	September	October	Total
Earth moving	2,318	3,676	5,242	4,623	5,195	21,054
Insulation and stacking	966	1,232	5,105	5,373	5,735	18,411
Welding and assembly	2,963	7,897	9,792	12,827	10,365	43,844

A fragment from the calculation of basic wages and premiums, taking tasks as agreed into account, is presented in the data in Table 3.

Table 3

Wages and Premiums for Normalized and Actually Completed Work

Indices	1982							1983	
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Monthly Output Norms Justifying Premiums (km)	6.1	15.7	15.7	15.7	15.7	15.7	15.7	15.7	11.0
Wages for Normalized Work Quantity (rubles)	26,422	68,004	68,004	68,004	68,004	68,004	68,004	68,004	47,646
Premiums for Piece Work (40%) (rubles)	10,568	27,201	27,201	27,201	27,201	27,201	27,201	27,201	19,058
Agreed Task (km)	7	21	23	23	21	20	12	--	--
Wages for Agreed Work Quantity (rubles)	30,320	90,961	99,624	99,624	90,961	86,630	51,978	--	--
Premiums for Piece Work (60%) (rubles)	2,858	13,774	18,972	18,972	13,774	11,175	20,791	--	--

As a result of fulfilling the obligations set in the agreement, on-line work on the Urengoy-Pomary-Uzhgorod section of the pipeline route was completed ahead of schedule.

New organizational structures, combined with advanced methods of economic stimulation, permit intensification of production processes, increase construction efficiency, and significantly increase the rate at which pipelines are built.

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CONTAINER SHIPMENTS VIA PIPELINES

Moscow NEFTYANIK in Russian No 3, Mar 83 pp 15-16 and Back Cover

/Article by M. Shvarts, from the SKB /Special Design Bureau/ Transnefteavtomatika /automated petroleum transport/: "Containers Travel Via the Pipeline"/

/Text/ On the existing mainline petroleum pipeline between Kirishi and Leningrad, a distance of more than 100 kilometers, an experimental industrial system of a containerized pipeline hydraulic transport (KTGT) has been built. This system is to be used to transport various petroleum products (oils, lubricants, oil additives, cleansing liquids, bitumen and others), which have been placed in elastic packaging containers within the flow of the light petroleum products that are being transported from the Kirishi oil refinery to the central repumping station at Krasnyy Bor.

In addition to the SKB Transnefteavtomatika many organizations and enterprises participated in the creation of the experimental-industrial KTGT system. The development and manufacture of the special equipment were largely done by the SKB Transnefteavtomatika. The equipment was installed and adjusted by the Leningrad enterprises of SMNU /probably "construction, installation and adjustment administration"/ of the Neftebazstroy /petroleum base construction organization/ Trust and the regional administration of mainline product pipelines. At the Novopolotsk Polytechnical Institute (NPI) the various modifications of the packaging containers were manufactured out of a sheet polyethylene. Preliminary tests of the unit were performed at the Novopolotsk oil refinery.

Container shells are filled with petrobitumen by a measuring device, which includes the mechanisms for the packaging and for the output of hermetically sealed containers. The device includes a thermostat and a distributor. In the thermostat the packaged containers are cooled to the temperature of the atmosphere.

A two-chamber device (an overall view is shown on the back cover) for the subsequent insertion of a batch of petrobitumen packaged containers was created at the lead repumping station (GPS). The sluice type chambers consist of a loading system, a technological binding system, a hydroelectrical automated system and a draining system. A basic diagram of this device is shown in Fig. 1.

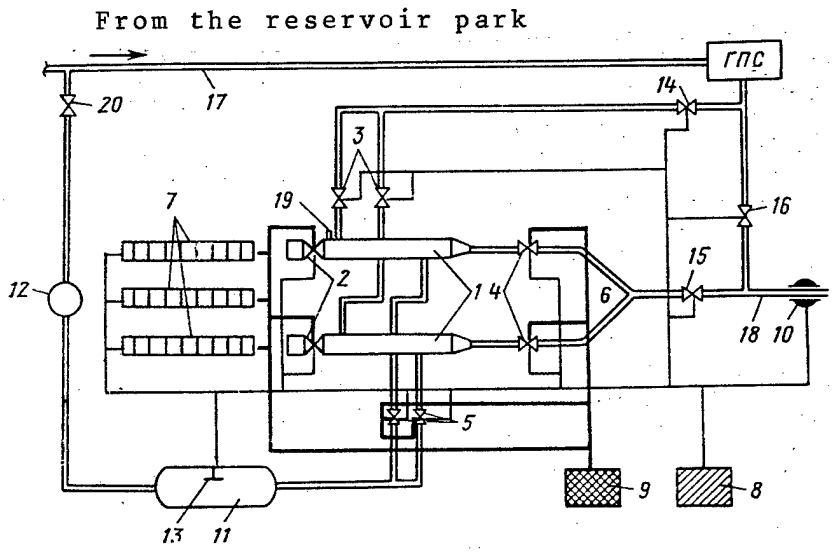

Fig 1. A basic diagram of a two-chamber device for the insertion of packaged containers:

Key: 1 - Insertion chamber; 2,3 and 4 - Hydrodrive gate valves: a blind valve, injection valve and intersecting valve; 5 - Drainage electrodrive gate valve; 6 - T-joint; 7 - Hydrodrive roller conveyer for loading the packaged-containers into the chambers for insertion; 8 - A control panel and equipment rack for the automated equipment; 9 - Hydrodrive station; 10 - Electronic equipment for keeping track of the packaged containers and other flow-line instruments; 11 - Drainage tank; 12 - Pump; 13 - 16 - Valves; 13 - Technological binding system; 14 - To the injection line connecting the GPS with the insertion chambers; 15 - Connecting chamber for the insertion from the line portion of the petroleum pipeline; 16 - Connecting GPS with the line portion of the petroleum pipeline; 17 - The intake line; 18 - Line portion of the petroleum pipeline; 19 - Air vent; 20 - valve.

The chambers 1 are a pipe, the diameter of which is an order larger than the diameter of the pipe on the line portion of the petroleum pipeline. Within the chambers there is a moveable tray. From one side of the chamber there is a blind hydrodrive gate valve 2, from the other through a cross bevel and a T-joint 6 are connected with the line portion of the petroleum pipeline 18. The chambers are equipped with an airvent 19 for releasing gas and with guages and manometric instruments, which are connected with an automated system.

(Backcover) - Device for inserting packaged containers on the Kirishi-Leningrad petroleum pipeline.

The technological binding of the insertion chambers consists of pipes of an appropriate diameter and welded gate valves. All valves are broken down into injection, intersecting 4 and drainage 5.

The loading system 7 of the packaged containers into the chambers 1 consists of three hydrodrive roller conveyors. The packaged containers and other flow-line instruments are fed onto the central roller conveyors, from where they are transported onto side roller conveyors and into one or another chamber.

All of the roller conveyors are equipped with guages for the automation system. This system consists of a panel and an automated equipment rack 8, the hydrodrive station 9, electronic equipment for counting the packaged containers 10 and other flow-line instruments, hydraulic and electrical utilities and various multipurpose guages.

The blind valves 2 are equipped with limit switches (sealed-contact reed relays). The drainage tank 11 and all hydro- and electrodrive valves are equipped with sealed-contact reed relays with magnets. The chambers have a pressure relay and ultrasonic warning devices for the level of the medium.

The drainage tank 11 with the float 13 is connected to the pump 12, through the use of which the accumulated petroleum product is pumped into the intake line 17 of the GPS.

The two-chamber device for inserting the packaged containers and other flow-line instruments can operate in an automatic mode. The petroleum product that is being repumped passes through one of the chambers 1 and carries along with it a batch of the packaged containers; then it is switched to another chamber with the loaded batch of packaged containers. The cyclical process of loading the packaged containers into the chambers and their subsequent insertion by batches in the petroleum product pipeline occurs when the valves 14 and 15 are open. The valve 16 is closed.

The experimental-industrial KTGT system in an automatic operating mode makes it possible to insert up to 100 packaged containers into the pipeline within an hour. The monitoring of the number of packaged containers, which are inserted in the petroleum product pipeline and then received at the end of the line, will be accomplished using an electronic device that counts the packaged containers 10 and 16, respectively.

The unloaded batch consists of three to four packaged containers, which have an identical length and diameter. Industrial experiments have shown that the packaged containers can be compacted and be placed almost on top of each other, which makes it difficult to count them. For this case the electronic counting device is fine-tuned at a specific length of the packaged containers and it precisely counts the number of packaged containers passing through the pipeline.

Acceptance of the packaged containers, and also the scrapers, separators and other flow-line instruments has several special features. First, it is necessary to accept the subsequently repumped petroleum products (gasoline, diesel fuel) and to separate the packaged containers from them. Second, since the packaged containers may arrive in a densely stacked bunch, as well as by themselves at various intervals, their acceptance is accomplished intermittently - to an open valve. A special two-chamber device ensures a reliable and uninterrupted acceptance of both the petroleum products and the packaged containers, scrapers, separators and other flow-line instruments. A basic layout of the device is shown in Fig 2.

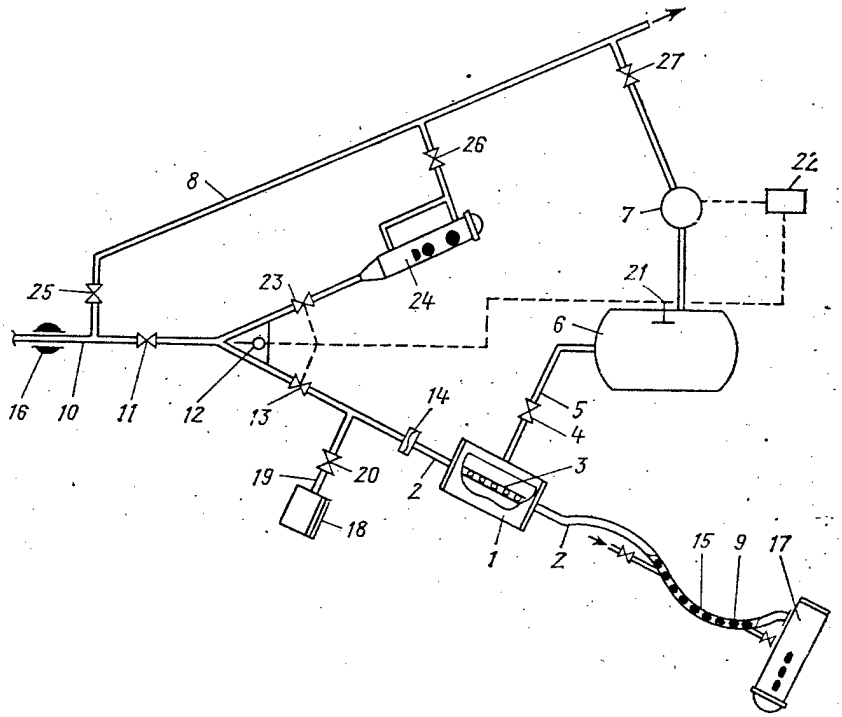

Fig 2. Basic layout of a two-chamber device for the acceptance of packaged containers and other flow-line instruments.

Key: 1 - Large diameter pipe with suppressed ends; 2 - Acceptance pipe with diameter equal to the diameter of the pipe on the line portion of the pipeline; 3 - Perforation on section of the acceptance pipe, placed in the pipe 1; 4, 11, 13, 20, 23, 25-27 - Valves; 5 - Pipe connecting with the buffer tank; 6 - Buffer tanks; 7 - Pump; 8 - Intake line of the repumping station or reservoir park; 9 - Packaged container; 10 - Pipe of the line portion of the pipeline; 12 - T-joint indicator; 14 - Regulating diaphragm; 15 - Washing solution; 16 - Electronic device for counting the arriving packaged containers and other flow-line instruments; 17 - Acceptance chamber; 18 - Compressor; 19 - Connecting pipe; 21 - Float; 22 - Automation system unit; 24 - Acceptance chamber for scrapers, separators and other flow-line instruments.

The device consists of a large diameter pipe with suppressed ends, through which the acceptance pipe 2 passes. On the section restricted by pipe 1, pipe 2 has a perforation 3. The total space of the openings in the pipe 2 is greater than the transverse section of the line portion of the petroleum pipeline.

The pipe 1 through the valve 4 and pipe 5 is connected with the buffer tank 6, which in turn passes through the pump 7 and is connected with the intake line of the pumping station or reservoir park.

The receipt of the packaged containers 9 occurs through pipe 10 through valve 11, indicator 12, valve 13 and the regulating diaphragm 14 into the acceptance pipe 2. Under the influence of the flow of the repumped petroleum products the packaged containers pass through the perforated section of the acceptance pipe 2, which is placed in pipe 1.

The petroleum products that are repumped go into the buffer tank and are pumped by pump 7 into line 8, and then the next packaged container which has been separated from the petroleum products, having passed through perforation 3, stops in pipe 2.

The next packaged container runs into the preceding one further on in pipe 2, which after leaving pipe 1 is located in a vertical plane of a sinusoid,. The concave portion of pipe 2 is filled with a washing solution 15, which forms a hydroseal.

In these experiments a solution based on Labomir-68 was used as the separating liquid. Having passed through the washing solution, the packaged containers 9 are cleaned of the petroleum products that are being repumped. The petroleum products, which form a film on the surface of the washing solution, go into an oil trap. The hydroseal prevents the vapors of the petroleum products being released into the atmosphere.

All packaged containers from the pipe 9 are fed into the acceptance chamber 17, from where they are removed.

In order to dislodge the final packaged container from pipe 2, the compressor 18 can be used.

The buffer tank 6 is equipped with a float 21. When filling the tank from the float through the appropriate guages a pulse is fed to unit 22 of the automation system. The pump 7 and valves 13 and 23 are connected to this unit.

In the automation system the "magnet-sealed contact reed relays" type guages are used. Should the pump 7 shut down a pulse is fed from unit 22 to the indicator 12, which directs the flow of the petroleum products and the packaged containers through the opened valve 23 (valve 13 is closed) into the acceptance chamber 24. Here the packaged containers are delayed and the flow of the petroleum products through valve 26 enters line 8. At the same time an emergency signal is fed to the shut down of the repumping through the pipeline.

The acceptance chamber 24 is essentially intended to receive the scrapers that are periodically run through the pipeline. When required separators and other flow-line instruments are also run through the pipeline.

If petroleum products alone are pumped through the pipeline, then valve 26 operates on line 8 and valves 11, 26 and 27 are closed.

The experimental data that has been obtained will help to solve the scientific and design tasks when developing, constructing and operating the industrial KTGT systems.

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